

## BEL (AEGLE MARMELOS L.) AS A POTENTIAL MEDICINAL TREE OF INDIA

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Article Received on 03/11/2023

Article Revised on 12/11/2023

Article Accepted on 14/12/2023

### ABSTRACT

India is the world's largest producer of medicinal plants, earning it The moniker "Botanical Garden of the World." Medicinal plants Play a significant role in the health and vitality of humans and Animals alike. With growing burden of diseases, the use of natural plant products is increasing due to its minimal side-effects and economical aspect. Phytochemicals from medicinal plants serve as lead compounds for drug discovery and design. *Aegle marmelos (L)* Correa belonging to family Rutaceae is one of the most useful medicinal plants of India. In marathi Angle marmelos is also known as Bel. Bel has been proven to offer a useful role in ethnomedicine. Various parts of Bel like leaves, roots, stems, fruit, and bark are composed of different phytochemicals like alkaloids, cardiac glycosides, terpenoids, saponins, flavonoids, steroids, and tannins. They are used as medicine due to their medicinal properties, including anti-diarrhoeal, anti-dysentric, antipyretic, antimicrobial, wound healing, diuretic, antifertility, antioxidant, analgesic, anti-inflammatory, hepatoprotective, etc. In addition to being a medicinal plant that grows on hillsides, the worship of Lord Shiva requires the offering of Bel leaves as an obligatory ceremony in Hindu culture. Bel possesses a variety of characteristics that reflect the significance of a variety of attributes, whether religious or therapeutic.

**KEYWORDS:** *Aegle marmelos*, Bel, Religious, Pharmacological activity, Rutaceae, Phytochemicals.

### INTRODUCTION



Figure

#### Synonyms

Hindi =Bel, bael, Sripal

Sanskrit =Bilva, sripthal shivadruma, Shivapala

English= Stone Apple

Telugu =Maredu

Bengali =Bel

Gujrati =Bil

#### INFORMATION

*Aegle marmelos*, commonly known as Bael or wooden apple belongs to the Rutaceae family. The leaves of

*Aegle marmelos* are offered to Lord Shiva, whose worship cannot be completed without the leaves of this tree. Bel is one of the most appreciated plants used in ayurvedic medicine by the Indian and other South Asian inhabitants in ancient history. According to the historical records, bel is used as a medicinal and food item since 5000 B.C. and known to human beings even when writing the famous Sanskrit epic-poem Ramayana.

Kingdom	Plantae
Subkingdom	Tracheobionta
Super division	Spermatophyta
Division	Magnoliopyta
Class	Magnoliopsida
Subclass	Rosidae
Order	Sapindale
Family	Rutaceae
Genus	<i>Aegle</i>
Species	<i>Marmelos</i>

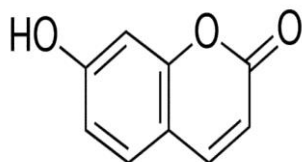
#### Taxonomical classification of *A. marmelos*

##### Chemical composition

Alkaloids, coumarins, and steroids, among other chemical ingredients, have been extracted and identified from the plant. Various tree parts, such as leaves, Fruits, wood, root, and bark are all edible.

### Coumarins

Marmelosin, marmesin, imperatorin, marmin, alloimperatorin, alloimperatorin, alloimperatorin, alloimperatorin, alloimperatorin, alloim Scaparone, methyl ether, xanthotoxol Umbelliferone, psoralen, and scopoletin Marmenol, also known as marmelide<sup>27</sup>, is a 7-geranyloxycoumarin [7-(2, 6-dihydroxy-2, 6-dihydroxy-2, 6-dihydroxy-2, 6-dihydroxy-2, 6-dihydroxy-2, 7-ethoxy-7-methyl-3-octaenyloxy)



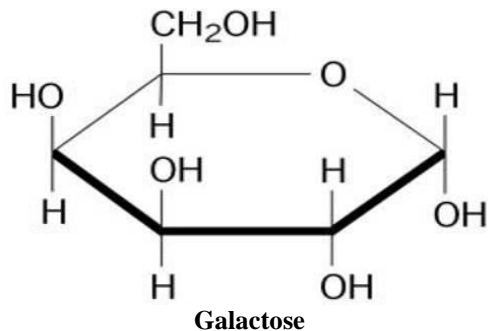
Umbelliferone

### 2) Alkaloids

Leaves mainly contain rutacine,  $\gamma$ -sitosterol, aegeline and aegeline, marmeline, fragrine, dictamine, cinnamide and different derivatives of cinnamide.

### 3) Polysaccharide

Reducing sugars such as galactose, arabinose and L-rhamnose are found in fruit. Carotenoids are present in fruit and responsible for characteristics color of fruit. It was found that root of *Aegle marmelos* tree contain psoralin, xanthotoxin and scopoletin.



Galactose

### Plant part

**Leaves:-**The deciduous, alternating leaves are made up of 3 to 5 oval, pointed, shallowly toothed leaflets that are 4-10cm long and 2-5cm wide, and are borne alone or in groups of two or three. A petiole that is lengthy mature leaves have a distinct odour. When bruised, it emits an unpleasant stench.



### Diagram

**Flower:-** Flowering takes place in April and May, shortly after the new leaf emerges. Fragrant flowers with four recurved, fleshy petals, green in colour, grow in clusters of four to seven along the immature branchlets.

Greenish on the outside, yellowish on the interior, and 50 or more greenish on the outside Stamens that are yellow.



### Diagram

**Fruit:-** Fruits The fruit, which is round, pyriform, oval, or oblong in shape and is 5-20cm in diameter, has a thin, hard, woody shell or a more oblong shell. Until the fruit is fully mature, or less soft rind, ggray-gree.

When it is fully ripe, it becomes yellowish. It's flecked with fragrant, Oil glands that are quite small. There is a hard central core inside, as well as a soft central core.



**Diagram**

**Seeds:** - 10 to 15 flattened-oblong seeds are present in the pulp. The seeds are around 1cm long, have fuzzy hairs, and are each contained in an adhesive, transparent sack mucilage that hardens as it dries.

**Diagram****Pharmacological Action**

**1)Diarrhoea and dysentery:** Generally dried fruit pulp and its powder are used for the treatment of diarrhoea. The dried powder is also used as an important remedy for chronic dysentery conditions characterized by alternate diarrhoea and constipation. It has been used for the treatment of amoebic dysentery.

**2)Antidiabetic activity:** Leaf extract of the bel plant is generally known for their antidiabetic activity. It has been found that bel extract significantly reduces blood urea and cholesterol level in diabetic animals. It also decreases oxidative stress in diabetic animal. Leaf juice is directly employed in Unani system of medicine for antidiabetic activity. Various studies as detailed below have signified its use as an antidiabetic agent. Ismail et al. evaluated antidiabetic activity of *Aegle marmelos* leaf decoction and found that approximately five grams of leaf decoction administered orally once daily possess antidiabetic effect.

**3)Antihyperglycemic activity:** When given orally at 250 and 500 mg/kg, the ethanolic extract of *Aegle marmelos* leaves has antihyperglycemic action. diabetic rats at a dose of mg/kg A discernible reduction the absorption of glucose and the inhibition of both enzymes amylase and intestinal disaccharide. The inhibition of activity resulted in the observation of activity. digestion and absorption of carbohydrates, and insulin action to uptake improvement Ansari et al., Glucose in Peripheral Tissue at 500 mg/kg *Aegle marmelos* leaf extract to assess hypoglycemic and antioxidant effects Diabetic rats were given the treatment.

**4)Anticonvulsant activity:** Aqueous extract of bel leaves have anticonvulsant properties against in mice, pentylenetetrazole caused seizures. Aqueous leaves have anticonvulsant properties.

The presence of *A. marmelos* extract was due to the presence of Skimmianine, Eugenol, Lupeollinoleate Liquid was the one who spotted it. Mass spectrometry chromatography.

**5)Anticancer activity:** Studies showed that Indian bel (*Aegle marmelos*) extract possess significant antiproliferative effect. It inhibits in vitro proliferation of human tumor cell lines including the leukemic K562 and Tlymphoid Jurhat. Kruawanetal compared antioxidant and antimutagenic activity of *Carthamus tinctorius* L., *Hibiscus sabdariffa* L., *Chrysanthemum indicum* L., *Aegle marmelos* L. and Jubliang. In this study they found that aqueous extracts are good sources of water soluble antioxidants, phenolic compounds and antimuta.

**6)Eye infections:** The leaves of bel are considered and effective treatment for ophthalmia and various eye inflammations such as conjunctivitis. The decoction of its flowers is also used as eye lotion.

**7)Snake bite antidote:** The roots, leaves and barks of the plant are often used as an antidote in the treatment of snakebite.

**8)Febrifuge:** Different parts of the plants are used in treating various types of fevers. For example, its bark decoction is administered in cases of malarial fever, leaf decoction is given in general fever, leaf paste is also used along with little honey in typhoid fever, etc. Studies have shown that bael extract can be used as febrifuge in night and for intermittent fever.

**9) Antiemetic:** A decoction of the flowers and roots of *Aegle marmelos* is used as an antiemetic.

**10)Haemostatic:** The unripe fruit of the plant are used in the form of powder or paste as haemostatic.

**11)Antipyretic and analgesic activity:** In one study it was found that bel extract exhibits antipyretic, anti-inflammatory and analgesic activities in experimental animals.

**12) Constipation:** The riped bel fruit act as good laxative. It promotes peristaltic movements and thus helpful in the removal of fecal matter.

**13)Peptic ulcer:** Bel fruit and leaf infusion has been used for the treatment of peptic ulcer. One of the important advantages of this fruit is that it forms a mucilaginous layer on the gastric mucosa and thus prevents interaction of acid with mucosal layer.

**14) Antioxidant:** Siddique et al. estimated the antioxidant activity of methanolic extract of leaves, root and stem bark of plant *Aegle marmelos*.

**Marketed Formulation Of *Aegle marmelos*.****Table 2: Marketed Formulation Of *Aegle Marmelos*.**

S.No	Marketed Formulation	Company name
1.	<i>Aegle Marmelos</i> Capsules	La-Medicca (India) Pvt. Ltd.
2.	Chyawanprash	Himalaya
3.	Leucare capsules	Shrey, Nutraceuticals & Herbals
4.	Entrostat Syrup	Ambika Medico
5.	Kof-Rid Syrup	Ambika Medico
6.	Pregeight	Sydler Remedies Pvt. Ltd.
7.	Pushyanugam gulika	Oushadhi
8.	Ojamin	Tates Remedies
9.	UlcoBliss Tablets	Bliss ayurveda
10.	R-Qunol Syrup	Vatsal Ayurvedic Products (P)ltd.

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