

## ***Aegle marmelos* (Bael) Benefit for Health: A Review**

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### **ABSTRACT**

*Bael is a subtropical plant and grows as much as an altitude of 1200 m above sea level. It is the most important medicinal fruit crop of India. Bael cultivation in India is mainly done in the states of Uttar Pradesh, Uttaranchal, Jharkhand, Madhya Pradesh, Rajasthan. All the plant elements like leaves, roots, barks, seeds and fruits of Bael are necessary ingredients of many ancient formulations against numerous diseases. Bael fruits are rich source in vitamins, minerals and many types of nutrients. Candy, panjiri, toffee, jam, etc. products are prepared by the fruit. It may be used for the remedy of diverse problems in person such as, diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia etc. The bael fruit pulp incorporates many practical and bioactive compounds which include carotenoids, phenolics, alkaloids, coumarins, flavonoids, and terpenoids and has innumerable conventional medicinal uses.*

**Keywords:** *Bael, Rutaceae, Health Benefit, India.*

### **INTRODUCTION**

*Aegle Marmelos* (Bael) is a subtropical plant, belong to Rutaceae family, chromosome number present in  $2n = 18$ . Fruits have been known in India since ancient times. The native place of the bael is considered to be India. Bael has a special place in the major fruits of India. Leaves are used as sacred imparting to 'Lord Shiva'. This fruit is produced in all parts of India. Bael cultivation in India is mainly done in the states of Uttar Pradesh, Uttaranchal, Jharkhand, Madhya Pradesh, Rajasthan. Bael is cultivated in Uttar Pradesh in Faizabad, Basti, Gonda, Mirzapur and

Etawah districts. In other countries mango cultivation can be done easily in parts of low rainfall (Sharma et al., 2007). Bael cultivation is mainly done in Sri Lanka, Pakistan, Bangladesh, Burma, Thailand, Malaysia, Cambodia, and other parts of South Asia. Bael has a special place in medicinal plants in India. Diseases are treated by chemical substances extracted from bael leaves, fruits and seeds (Maity et al., 2009). Vitamin C content material of fruit is also better than of apple. The ripe fruit is sweet, fragrant and really palatable being rather esteemed and eaten with the aid of using all instructions of people.

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The bael fruit pulp incorporates many practical and bioactive compounds which include carotenoids, phenolics, alkaloids, coumarins, flavonoids, and terpenoids and has innumerable conventional medicinal uses (Singh, 1986; & Nagaraju & Rao, 1990) Although its miles grown in nearly all of the states of India but its cultivation has acquired extremely good impetus in latest years in Northern a part of India because of extensive adoptability and cap potential to face up to drought, low fee of cultivation and excessive economic returns. Because of the data on area and productivity per unit area, as well as



suitability for different types of wasteland, these fruits are very popular to grow, and fruits have also shown great potential for the processing industry.

#### DIFFERENT NAMES OF BAEL

English (Bael Fruit, Golden Apple, Indian Bael, Bengal Quince, Holy Fruit, Indian Quince, Stone Apple, Elephant Apple), Hindi (baelputri, bela, sirphal, siri-phal, kooralam), Gujrati (Bili), Panjabi (Bil), Bengali (Bilbam), Telgu (Maredu, Bilbpandu) Latin (Aeglemarmelos Corr), Tamil (Bilbam), Sindhi (Katori), Oria (Belo), Marathi- (Bael).



#### USES AND HEALTH BENEFITS OF BAEL FRUIT

The bael fruit is to be considered a boon in the herbs. Which is being used in human life since ancient times. Bael is used to cure jaundice. The joint pain and swelling of bael leaf joint is removed. The bael controls the blood pressure. Bael is also used to remove skin and hair diseases. Liver disorder can also be overcome with the use of bael. The use of bael leaves and fruits control diabetes-like disease. Indigestion and constipation are controlled by bael juice. Ulcer disease is cured by the fruit of bael. Bael juice extracts toxins from the body. Bael juice increases the energy level in the body. Bael fruit is good for pregnant women.

Nutrition scientists emphasize to take as a minimum a one hundred fifteen grams of fruit each day for balanced diet. Appropriate nutrients stimulate most excellent increase and improvement of human body.

#### CHEMICAL CONSTITUENTS

Various phytoconstituents were removed from the numerous components of *Aegle marmelos*, which can be categorised as: Fruit: Auraptin, Marmelosin, Luvangetin, Tannin, Psoralen, Marmelide. Leaf: Citronella, Skimmianine, Aegeline, Lupeol, Citral, Cuminaldehyde, Eugenol, Marmesinine, Cineol. Bark: Fagarine, Marmin, Skimmianine (Maity et al., 2009).

**Table 1: Nutritional value of Bael Fruit (% or per 100 g)**

Components	Value (%)	Components	Value (%)
Water (moisture)	64.2	Potassium	0.6
Protein	1.8	Iron	0.3
Fat	0.2	Vitamin A (IU)	186
Mineral	1.5	Vitamin B1	0.01
Fiber	2.2	Nicotinic acid	0.9
Carbohydrate	30.6	Riboflavin	1.2
Calcium	0.09	Vitamin C	0.01
Phosphorus	0.05	Calorific value	129

(Source: Shankar, 1967 & Neeraj et al., 2017)

**PLANT DESCRIPTION**

Bael (*Aegle Marmelos* Linn), family Rutaceae, is also known as Bale fruit tree, is a moderate sized, slender, aromatic and medicinal tree, 6.0 -7.5 m in height, and 90 to 120 cm in girth, alternate leaves, toothed leaflets, new foliage is glossy and pinkish-maroon. The flowers are greenish white in colour. Flowering occurs during the month of May and June. Fruit is spherical or oval in shape with a diameter of 2 to 4 inch. The pulp is yellow, soft, sweet, resinous and fragrant. Fruition occurs in the month of May and June. with a somewhat fluted bole of 3.0-4.5 meter growing wild throughout the deciduous forests of India, ascending to an altitude of 1200 meter in the western Himalayas and also occurring in Andaman island. This is generally considered as sacred tree by the Hindus, as its leaves are offered to Lord Shiva during worship. According to Hindu mythology, the tree is another form of Lord Kailashnath. Leaves, fruit, stem and roots of this tree at all stages of maturity are used as ethno medicine against various human diseases.

**ORIGIN AND DISTRIBUTION**

Woody tree, Bael is native to India. *Aegle marmelos* is a broadly disbursed plant and observed in India, Ceylon, China, Nepal, Sri Lanka, Myanmar, Bangladesh, Sri Lanka, Pakistan, Nepal, Cambodia, Vietnam, Laos, Malaysia, Thailand, Indonesia, Fiji, Tibet, Java and Philippines.

**PRODUCTION TECHNOLOGY**

**Climate:** The bael fruit tree is a subtropical species. warm humid weather is appropriate for cultivation of this plant.

**Soil:** A good sandy soil, in sunny condition, a warm and humid climate are adapted to the cultivation of this plant. It takes a pH between 5 and 8. Use hot soil i.75- 90F.

**Cultivars**

**C.I.S.H., Lucknow, Uttar Pradesh:** CISH B-1, CISH B-2

**G.B.P.U.A.T. Pantnagar, Uttarakhand:** Pant Urvashi, Pant Aparna, Pant Shivani, Pant Sujata.

**N.D.U.A.T. Faizabad, Uttar Pradesh:** Narendra Bael-4 Narendra Bael-5, Narendra

Bael-7, Narendra Bael-9, Narendra Bael-16, Narendra Bael-17.

**Central Horticultural Experiment Station:** Gujarat, Goma Yashi, Godhra.

**Other Cultivar:** Gonda No-1, Gonda No-2, Gonda No-3, Kagzi Etawah, Sewan Large, Deoria Large, Chakaiya, Lamba, Baghel and Mirzapuri.

**Land preparation:** For Bael plantation, it needed well cleared sandy or loamy soil. To bring the soil to fine tilth pits are mammary gland of size 90cm x 90cm x 90cm and therefore the mix of garden soil and 25 kg FYM, 1kg of tree feed and 1kg of bone dirt is crammed within the dug. Irrigation ought to be done to settle the soil.

**Time of sowing:** February to March and July to August are good months for sowing.

**Spacing:** Budded plant distance of 8m x 8m and seedlings plant distance 10m x 10m.

**Propagation:** Bael is commonly propagated by seeds for cultivation, commercial propagation method of budding. Patch budding and ring budding is a perfect manner of reproduction. The success rate is higher during this method.

**Planting:** Rainy season is the nice time for planting. However, planting also can be finished in spring season if irrigation centres are available. Dig the planting pits of 1m x 1m x 1m length as a minimum one month previous to onset of monsoon. The pits should be left open for 15 to 25 days so that the plant gets sunlight. 10 to 15 kg of cow dung manure should be added to the pits, after that plant should be planted in the centre of the pits and cover the root with soil then irrigate the plants.

**Manure and Fertilizer:** For good production, manure and fertilizers should be provided in the plant on time. Apply 10kg farm farmyard manure, 50g N, 25g P and 50g K per plant to one year old plants. This dose must to be expanded each year with inside the identical share as much as the age of 10 years, and then the constant dose should be implemented every year. Half dose of N, complete dose of P and 1/2 of dose of K should to take delivery of after harvesting the end result. Remaining 1/2

of dose of N and K must to take delivery of with inside the remaining week of August.

**Irrigation:** In summer, water is required for vegetable growth of plants. Water should be given at intervals of 7 days in summer. In winter, water is given at intervals of one month. Irrigation may be implemented on the time of latest leaf emergence.

**Training and pruning:** Bael plant are trained by the modified central leader. Pruning is carried out two times in a year, as soon as in May and different in August. Pruning is restricted to the elimination of lifeless and diseased twigs/branches in May.

**Harvesting and Yield:** Budded and grafted plant life begin fruiting after 4-5 years of planting whereas, seedlings after 8-10 years of planting. Bael Fruit takes round 8-10 months to mature and 10-12 months for ripening after fruit set. The ripening of the fruit is detected when the green colour changes to yellow colour. A complete grown (10-12 years old) budded or grafted bael tree produces on a median 150-200 fruit under best management practices.

**Post-Harvest:** After harvesting, grading is done. Then conclusion is packed in gunny baggage transfer for lengthy distances. It is saved for 15 days. Artificial remedy is likewise given to shop the bael for longer time. From ripen Bael numerous merchandises like juices, squash, jam, toffees and powders are made after processing.

### CONCLUSION

Bael is a cultural fruit as well as medicinal fruit. Candy, panjiri, toffee, jam, etc. products are prepared by the fruit. Bael farming can be done in all types of silos. Diseases are treated by chemical substances extracted from bael leaves, fruits and seeds. The most significant ingredients present in plants are alkaloids, terpenoids, steriods, phenols glycosides and tannins. it may be used for the remedy of diverse problems in person such as, diabetes, liver toxicity, fungal infection, microbial infection, inflammation, pyrexia etc. The farmer can get more income at a lower cost by cultivating it.

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