



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 15, Issue 2, February 2026

Aegle Marmelos (Bael): An Overview of Its Pharmacological, Phytochemical, and Medicinal Applications

Priyanka Sawant¹, Divya Jadhav², Vivika Bhoir³

Assistant Professor, Department of Pharmacy, M.S. College of Pharmacy, Devghar, Maharashtra, Mumbai University,
Maharashtra, India¹

B. Pharmacy Student, M.S. College of Pharmacy, Devghar, Maharashtra, Mumbai University, Maharashtra, India^{2,3}

ABSTRACT: Aegle Marmelos (L.) Correa, commonly known as Bael, is a sacred and medicinally important plant belonging to the family Rutaceae. Every part of the tree—including its fruit, leaves, bark, roots, and seeds—has been used for centuries in traditional Indian medicine systems such as Ayurveda, Siddha, and Unani. Phytochemical studies have revealed that Aegle Marmelos contains a wide range of bioactive compounds such as alkaloids, flavonoids, phenolics, tannins, and coumarins, which are responsible for its diverse pharmacological actions. Scientific investigations have confirmed its strong antimicrobial, antioxidant, antidiabetic, anticancer, hepatoprotective, and antiulcer properties. Experimental studies demonstrate that bael extracts effectively regulate blood glucose levels, protect the liver from toxins, inhibit tumour growth, and combat bacterial, viral, and fungal infections. Its antioxidant and anti-inflammatory activities also contribute to the management of oxidative stress and chronic diseases. With growing global interest in natural therapies, Aegle Marmelos holds great promise as a safe, cost-effective, and sustainable source for developing novel herbal formulations and modern phytopharmaceuticals.

KEYWORDS: Aegle Marmelos, Bael, Ayurveda, phytochemicals, antimicrobial, antidiabetic, antioxidant, anticancer, antiulcer, hepatoprotective, medicinal plant, traditional medicine, natural remedy, pharmacological activity.

I. INTRODUCTION

Aegle Marmelos (Linn.) Correa, commonly known as bael or bel, is a medium-sized, aromatic tree belonging to the Rutaceae family and holds great significance in traditional Indian medicine. Almost every part of the plant, including its fruit, leaves, bark, and roots, is used for various therapeutic purposes due to its wide range of medicinal properties. For centuries, it has been an essential component of Ayurveda and other indigenous healing systems, known for treating ailments such as digestive disorders, diabetes, and infections. Recently, the growing awareness of the adverse effects and limitations of synthetic drugs has sparked renewed global interest in herbal remedies like Aegle Marmelos, highlighting its potential as a safe and effective natural alternative for promoting health and wellness [1-3].

For thousands of years, plants have been the foundation of traditional medicine systems across the world and continue to play a crucial role in modern healthcare. More than half of today's therapeutic drugs are either natural products or derivatives of them, reflecting the enduring importance of plant-based compounds in drug discovery and development. Herbal remedies are gaining popularity globally because of their proven effectiveness, cost-efficiency, and fewer side effects compared to synthetic medicines. Currently, nearly 30% of pharmaceutical formulations are derived from plant sources, and to meet the increasing demand for herbal based drugs, many developed nations rely on the developing world for the supply of raw medicinal plants and materials [4-6].

**Figure 1. : Beal Tree****FIGURE 2. BEAL FRUIT**

Recent studies have shown that *Aegle Marmelos* has amazing antimicrobial properties. Its extracts are very effective against a wide range of bacterial and fungal pathogens, such as *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*. Research has also revealed its promising antiviral potential, showing effectiveness against viruses such as herpes simplex and dengue, suggesting its possible application in managing viral infections. Moreover, the plant's potent antioxidant activity, attributed to its high flavonoid and phenolic content, has garnered significant attention for its ability to combat oxidative stress, thereby contributing to the prevention of various chronic diseases, including cardiovascular and neurodegenerative disorders. The growing scientific and commercial interest in *Aegle Marmelos* reflects a broader global shift toward revitalizing traditional medicinal plants and integrating them into modern healthcare systems. Advances in phytochemical analysis, molecular docking, and bioinformatics have significantly made it easier to understand the biological mechanisms underlying its diverse therapeutic effects. Beyond its medicinal applications, *Aegle marmelos* shows great promise in the development of functional foods, nutraceuticals, and herbal formulations, underscoring its versatility and economic value. This review seeks to provide a comprehensive overview of the plant's phytochemical composition, pharmacological properties, and future potential, while also exploring its traditional medicinal relevance. By bridging traditional knowledge with modern scientific validation, the review strengthens the evidence supporting the medicinal and therapeutic importance of *Aegle Marmelos* [7-9].

PLANT PROFILE [10]**Kingdom:** Plantae**Division:** Magnoliophyta

Class: Magnoliopsida

Order: Sapindales

Family: Rutaceae

Genus: Aegle

Species: Marmelos

Common name: Bael

Synonyms: Bilva, Triphla, Maredu, Baunau, Modjo bel, Kuvalum, Shivapala, Bael etc.

II. PLANT MORPHOLOGY

Aegle Marmelos is a slow-growing, medium-sized tree that can reach a height of 12–15 meters, characterized by a relatively short trunk and occasionally thorny branches, with the lower ones tending to bend downward. The young leaves are glossy with a pinkish-red tint, while the mature ones emit an unpleasant odor when damaged. Its fragrant flowers, which grow in clusters of four to seven on young twigs, have four curved, fleshy petals—green externally and yellowish internally—and contain more than 50 greenish-yellow stamens. The fruit varies in shape depending on the variety, ranging from round and pear-shaped to oval or oblong, measuring 5–20 cm in diameter. The rind may be thin or thick, hard or soft, and is marked with small aromatic oil glands. Inside, the fruit features a firm central core surrounded by 8–20 triangular sections with thin, dark-orange walls enclosing aromatic, sticky, pale-orange pulp that is sweet, resinous, and slightly astringent. Each fruit typically contains 10–15 compressed, oval seeds about 1 cm long, covered with fine hairs and encased in a sticky, transparent gel that solidifies upon drying [11-13].

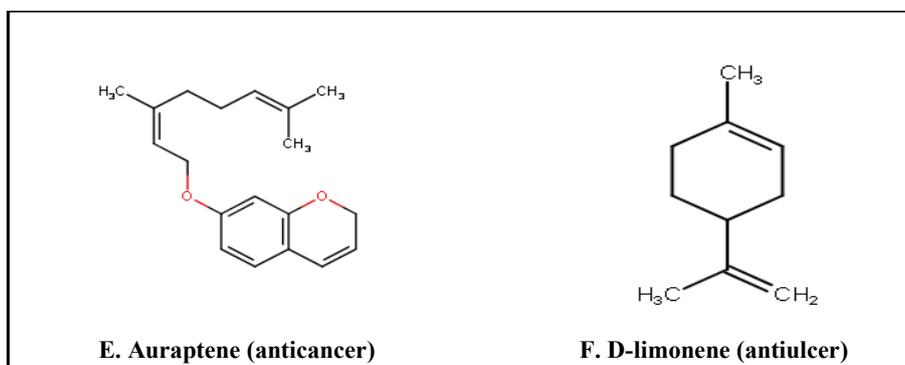
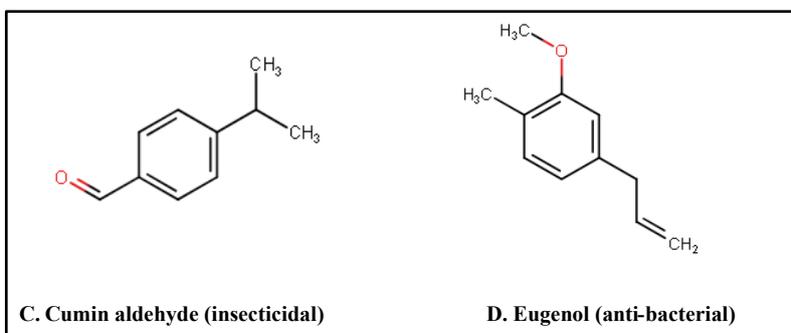
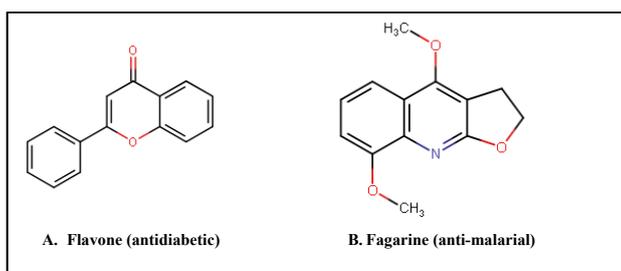
III. USE OF PLANT PARTS [14-17]

- **LEAVES:** The leaves of Aegle Marmelos hold significant medicinal value in traditional medicine and are widely used to treat a range of ailments. They are commonly employed in managing eye disorders and ulcers, while tender leaves are prescribed for heart conditions, inflammation, and vitamin B1 deficiency. Known for their digestive benefits, the leaves help regulate bowel movements and assist in controlling blood sugar levels, making them beneficial for diabetic management. Additionally, they have been used effectively in the treatment of jaundice and asthma, owing to their detoxifying and anti-inflammatory properties. The leaves are particularly valued for their expectorant action, which helps clear mucus from the bronchial tubes and supports respiratory health.
- **ROOT AND BARK:** The roots of Aegle Marmelos are highly valued in traditional medicine for their diverse therapeutic applications, particularly in the treatment of urinary disorders, heart palpitations, fever, and stomach discomfort. A decoction made from the root and bark is traditionally used to manage conditions such as melancholia, palpitations, and recurrent fevers due to its soothing and restorative properties. The root also holds an important place in Ayurveda as one of the ten key components of the renowned formulation Dash amula, which is widely used for its rejuvenating and anti-inflammatory effects. Furthermore, a mixture prepared from bael root extract, onion, and turmeric in equal proportions has been found effective in treating ear discharges, highlighting the root's broad spectrum of medicinal uses in traditional healing practices.
- **FLOWER:** The flowers of Aegle Marmelos possess notable medicinal properties and are traditionally used as an expectorant and in the management of epilepsy. Their astringent and antibacterial qualities make them effective in treating various ailments, particularly those involving infections or inflammation. A distillate known as marmala water, obtained from the flowers, has been found beneficial in the treatment of conjunctivitis, owing to its soothing and antimicrobial effects. These therapeutic attributes highlight the diverse pharmacological potential of Aegle Marmelos flowers in traditional healing systems.
- **FRUIT:** The fruit of Aegle Marmelos is highly valued for both its nutritional and medicinal properties and is commonly used in the preparation of sweet pickles, puddings, and refreshing beverages. Beyond its culinary appeal, the fruit serves as a natural laxative and is traditionally utilized to treat respiratory ailments and digestive disorders. It has been incorporated into various herbal remedies for managing chronic diarrhea and peptic ulcers and reducing lipid peroxidation, thereby supporting overall gastrointestinal and metabolic health. Research also indicates that bael fruit extract may aid in thyroid therapy by promoting hormonal balance in different parts of the body. Additionally, when mixed with boiled rice water, it is considered an effective traditional remedy for alleviating nausea and vomiting during pregnancy, highlighting its gentle yet potent therapeutic potential.
- **SEED:** Extracts from the seeds of Aegle Marmelos exhibit significant anti-diabetic and hypolipidemic properties, making them valuable in regulating blood sugar and cholesterol levels. Rich in dietary fibre, the seeds are effective in

relieving digestive disorders such as constipation, diarrhea, and irritable bowel syndrome by promoting healthy bowel function. Their notable anti-inflammatory activity also helps alleviate respiratory conditions like asthma and bronchitis. Furthermore, the presence of potent antioxidants in the seeds contributes to protecting the body against oxidative stress, thereby reducing the risk of chronic diseases and supporting overall health and wellbeing.

IV. PHYTOCHEMICAL COMPOSITION OF AEGLE MARMELOS [18-20]

The phytochemical composition of Aegle Marmelos (bael) is highly diverse, encompassing a wide array of bioactive compounds that underpin its extensive therapeutic potential. Major constituents include alkaloids, flavonoids, phenolic compounds, tannins, terpenoids, coumarins, and essential oils, all of which have been identified through advanced analytical techniques such as GC-MS and HPLC. Among these, marmelosin—a prominent coumarin derivative found in the bael fruit—exhibits potent antioxidant, antidiabetic, and hepatoprotective properties. Additionally, other coumarins like imperatorin and psoralen have demonstrated significant antimicrobial and anti-inflammatory effects in preclinical studies, further validating the pharmacological relevance of Aegle Marmelos as a valuable source of natural therapeutic agents.



V. PHARMACOLOGICAL STUDIES [21-25]

Bael (Aegle Marmelos) possesses remarkable medicinal properties supported by extensive pharmacological research. Its strong antimicrobial, antioxidant, and anti-inflammatory effects are attributed to the presence of bioactive phytochemicals such as alkaloids, flavonoids, and tannins. Studies have shown that bael extracts effectively inhibit the growth of pathogenic bacteria, including *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*, while also exhibiting potent antifungal and antiviral activity against *Candida albicans* and the dengue virus. In vivo experiments demonstrate its ability to reduce oxidative stress, lipid peroxidation, and pro-inflammatory cytokines, suggesting potential for managing chronic inflammatory disorders. Furthermore, bael exhibits neuroprotective properties by enhancing cognitive function and reducing amyloid-beta accumulation, indicating possible applications in the treatment of neurodegenerative diseases such as Alzheimer's. Its antidiabetic potential is equally significant, with both animal and clinical studies confirming improvements in insulin sensitivity, regulation of carbohydrate-metabolising enzymes, and reductions in fasting blood glucose and HbA1c levels, establishing bael as a promising natural therapeutic agent for metabolic and neurological health.

❖ ANTIBACTERIAL ACTIVITY

The antibacterial potential of Aegle Marmelos (bael) leaf extracts has been extensively evaluated against multi-drug-resistant bacterial strains using the disc diffusion method, revealing that the petroleum ether extract exhibited superior antibacterial activity compared to the standard antibiotic streptomycin. To further quantify this effect, a microtiter plate assay was employed, wherein bacterial cultures were incubated in nutrient broth with varying concentrations of the extract. After 24 hours, bacterial growth was assessed by measuring optical density, confirming that higher extract concentrations significantly inhibited microbial proliferation. These findings highlight the potent antibacterial efficacy of Aegle Marmelos leaf extracts, suggesting their potential as natural alternatives to conventional antibiotics in combating resistant bacterial infections.

❖ ANTIMALARIAL ACTIVITY

Methanolic extracts of Aegle Marmelos leaves have demonstrated significant ant plasmodial activity, exhibiting an IC_{50} value of 7 $\mu\text{g/ml}$ against *Plasmodium falciparum* while maintaining low cytotoxicity, indicating their potential as safe and effective antimalarial agents. Comparative studies revealed that although the crude leaf extracts of Aegle Marmelos displayed moderate larvicidal effects against *Anopheles stephensi*, the standard larvicide Temephos showed stronger efficacy, with an IC_{50} value of 500.06 ppm. These results suggest that Aegle Marmelos possesses promising bioactive compounds with ant plasmodial and larvicidal properties, supporting its potential role in developing natural alternatives for malaria control and vector management.

❖ ANTIDIABETIC ACTIVITY

Extracts from Aegle Marmelos fruit have demonstrated potent antidiabetic effects, significantly reducing blood glucose levels in streptozotocin-induced diabetic rats by promoting insulin production through partial restoration of pancreatic islet cells. Experimental studies revealed that mice treated with Aegle Marmelos extract showed superior glycaemic control compared to those administered glipalamides, a standard antidiabetic drug. Furthermore, in vitro assays assessing glucose absorption in yeast cells confirmed a strong hypoglycemic effect of the fruit's lectin extract, which exhibited an IC_{50} value of 3.36 $\mu\text{g/ml}$ and surpassed metformin in enhancing glucose uptake. These findings suggest that the remarkable antidiabetic potential of Aegle marmelos fruit extract may be attributed to its rich content of bioactive compounds that effectively regulate glucose metabolism and support pancreatic function.

❖ ANTI CANCER

The cytotoxic and anticancer potential of Aegle Marmelos has been demonstrated through both in vitro and in vivo studies. Methanol and acetone extracts of the plant showed significant cytotoxic effects against HEP-2, MDA-MB-231, and Vero cell lines, with IC_{50} values of 47.08 $\mu\text{g/ml}$ and 79.62 $\mu\text{g/ml}$, respectively, indicating higher susceptibility of HEP-2 cells. MTT assays on MCF-7 human breast cancer cells confirmed strong anticancer activity, while the flavonoids present in the fruit extracts acted as natural reducing agents, enabling the biosynthesis of gold nanoparticles with enhanced therapeutic potential. The aqueous pulp extract also exhibited notable cytotoxicity against MCF-7 cells, showing an IC_{50} of 47.92 $\mu\text{g/ml}$ at a concentration of 100 $\mu\text{g/ml}$. In vivo studies further supported these findings—Swiss albino mice bearing Ehrlich ascites carcinoma treated with a hydroalcoholic extract (400 mg/kg) showed a prolonged median survival of 28 days. Similarly, ethanolic fruit pulp extract treatment in a rat breast cancer model produced significant anti-proliferative effects, reducing tumour volume ($p < 0.05$) and improving blood biomarker profiles ($p < 0.0001$), confirming Aegle Marmelos as a promising natural anticancer agent.

❖ ANTIULCER

Methanolic and aqueous extracts of Aegle Marmelos seeds have demonstrated significant antiulcer activity in indomethacin-, stress-, and pylorus ligation-induced ulcer models, with ranitidine (50 mg/kg) used as the standard reference drug. Traditionally employed in Ayurveda for treating ulcers and gastrointestinal disorders, A. Marmelos exhibits strong gastroprotective effects supported by experimental evidence. In rat models with *Helicobacter pylori*-induced gastric ulcers, oral administration of the methanolic extract (500 mg/kg) reduced ulcer formation by an impressive 93.98%, while markedly decreasing gastric secretory parameters such as free and total acidity, acid output, gastric juice volume, and pepsin concentration, thereby alleviating ulcer severity. Although *H. pylori* is a major cause of peptic ulcers, limited research exists on the direct antibacterial action of A. Marmelos against this pathogen. Further studies are needed to evaluate its potential role in combating *H. pylori* infections and reducing antimicrobial resistance (AMR), which could position A. Marmelos as a safe and effective herbal alternative for ulcer management and abscess treatment.

❖ RADIOPROTECTIVE ACTIVITY

Bael (Aegle Marmelos) fruit extract has exhibited remarkable radioprotective properties in both animal and cellular models. In studies involving Swiss albino mice, proadministration of the extract at doses of 5–80 mg/kg for five days before exposure to 10 Gy of gamma radiation resulted in significantly improved survival, with the 20 mg/kg dose showing the greatest protection—50% survival at day 10 and 29% at day 30 ($p < 0.001$). The treatment notably increased glutathione (GSH) levels in vital organs such as the stomach, intestine, liver, and kidneys, while simultaneously reducing lipid peroxidation and mitigating radiation-induced oxidative damage. These protective effects are attributed to the extract's potent free radical scavenging and antioxidant activity. In vitro studies using human peripheral blood lymphocyte cultures further confirmed its radioprotective efficacy, showing reduced micronuclei formation in a dose-dependent manner. Collectively, these findings highlight bael fruit extract as a promising natural radioprotective agent with potential therapeutic applications in minimising radiation damage and supporting cancer treatment, especially in patients undergoing radiotherapy for visceral malignancies.

❖ DIURETIC ACTIVITY

At a high intraperitoneal dose of 500 mg/kg, the ethanolic extract of Aegle Marmelos (bilva) demonstrated a significant increase in salt excretion, confirming its strong diuretic potential. Experimental studies on albino rats further revealed that both the roots and leaves of bilva exhibited notable diuretic activity at a dose of 90 mg/200 g, with the roots producing a more pronounced effect. However, recent research indicates that bilva leaves can effectively serve as an alternative to the roots, providing comparable diuretic benefits. This finding supports the sustainable use of bilva leaves as an independent diuretic agent, particularly in traditional Ayurvedic Dasha Moola formulations, where they may replace the roots without compromising therapeutic efficacy.

❖ HEPATOPROTECTIVE ACTIVITY

Animal studies have demonstrated the potent hepatoprotective properties of Aegle Marmelos (bael) leaves. In one experiment, rats administered 40% ethyl alcohol for 40 days exhibited significant liver damage, while those treated with Aegle Marmelos leaf extract showed marked protection and restoration of liver function. A dose of 500 mg/kg effectively countered paracetamol-induced hepatotoxicity, while therapeutic doses of finely powdered leaves in ethanol-intoxicated rats normalised key metabolic parameters. These findings highlight the ability of bael leaves to protect hepatic tissue from both alcohol- and drug-induced damage, likely through antioxidant and membrane-stabilising mechanisms. Remarkably, the hepatoprotective efficacy of Aegle Marmelos leaf extract was found to be comparable to that of silymarin, a standard reference drug for liver protection, underscoring its potential as a natural and effective alternative for managing liver disorders.

❖ ANTIVIRAL

The ethanolic extract of Aegle Marmelos fruit has demonstrated strong antiviral activity, particularly against the Ranikhet virus, with the key viricidal compound marmelide shown to inhibit viral replication at an early stage of infection. Studies using a 50% ethanolic extract confirmed its antiviral potential, revealing interferon-like properties that distinguish its mechanism from that of conventional antiviral agents used against the vaccinia virus. These findings suggest that Aegle Marmelos could serve as a promising natural antiviral agent, though further research is needed to evaluate its effects on late-stage viral protein synthesis. In addition to its antiviral properties, the volatile oil extracted from Aegle Marmelos exhibits potent antifungal activity, completely suppressing spore production in eight fungal strains at a 0.05% concentration. Lower concentrations of 0.03% and 0.04% inhibited fungal growth by approximately 75% and 90%, respectively, while inhibition of the Fudum strain reached 65% and 80% at the same concentrations. Together, these results highlight the broad-spectrum antimicrobial potential of Aegle Marmelos, encompassing both antiviral and antifungal activities.

✿ Bael for Digestion and Constipation

One of the significant benefits of bael fruit juice is treating digestion and constipation problems. Bael has a high content of pectin and dietary fibre, which regulates bowel movement and helps maintain a healthy digestive system. The high content of tannin in bael leaves helps reduce inflammation. Further, bael is also used because of its laxative property, which cleans the intestines and prevents constipation.

✿ Bael for Heart Health

Another benefit of bael fruit is improved heart health. Bael is considered a natural antioxidant and cardioprotective fruit due to the presence of potassium and other beneficial compounds. These compounds help strengthen the heart muscles and reduce the cholesterol level in the blood. The bael fruit also prevents the formation of lipid accumulation, which further reduces the risk of blood clots, heart attacks, atherosclerosis, etc.

✿ Bael for Diabetes

In addition to this, bael fruit juice benefits include controlling blood sugar levels in diabetes patients. Bael plants or bark contain Feronia gum, which helps regulate the production of insulin from the cells. Further, the bael fruit has a low glycaemic index, which helps maintain the blood sugar level. Individuals who suffer from diabetes should consider consuming a glass of bael juice every day to manage their blood glucose levels.

✿ Bael for Stomach Ulcers

Stomach ulcers are formed due to the accumulation of free radicals in the stomach. Bael possesses antioxidant properties, which help reduce the oxidative stress in the stomach lining, which further prevents the formation of stomach ulcers. Further, the glycoprotein secretions of bael help treat colic pain. Due to its soothing properties, the pulp of bael can also be very beneficial in mouth ulcers.

✿ Bael for Strong Immunity

Another significant benefit of bael fruit and bel patra is strong immunity due to the presence of vital nutrients such as vitamins A, C and B-complex. Its high content of antioxidants, including phenolic compounds and flavonoids, helps neutralise harmful free radicals in the body, thereby reducing oxidative stress and inflammation. Additionally, bael has antimicrobial properties, which aid in protecting the body against infections.

✿ Bael for Respiratory Anomalies

Bael possesses antibiotic, anti-inflammatory, and anti-asthmatic properties, which help treat various respiratory anomalies such as the common cold and cough. It also lowers the rheumatological deposits in the chest and nasal cavities, which further helps get rid of mucus and ease the breathing process. Further, due to its anti-asthmatic properties, it is beneficial for bronchitis and asthmatic conditions.

✿ Bael for Blood Purification

Besides this, bael leaf medicinal uses also include blood purification. Bael contains a high amount of potassium, which helps in removing toxins and purifies the blood. Not just this, it also helps in improving the overall immunity of the body. Due to this, bael fruit is highly used in treating liver, heart and kidney problems.

✿ Bael for Scurvy

Scurvy is another significant disease caused by a vitamin C deficiency, which causes soreness in the legs and arms. Bael has a high vitamin C content, which is essential for the synthesis of collagen, the repair of tissues, and the overall maintenance of skin, blood vessels and bones. By incorporating bael into the diet, individuals can ensure an adequate intake of this vital nutrient, thus preventing or treating scurvy.

TRADITIONAL USES OF A MARMELOS

Aegle Marmelos (L.) Correa, commonly known as Bael, is a revered medicinal plant deeply rooted in traditional healing systems such as Ayurveda, Siddha, and Unani for its diverse therapeutic benefits. Nearly every part of the Bael tree—leaves, fruit, bark, roots, and seeds—is used to manage various ailments. The ripe fruit aids digestion and relieves constipation, while the unripe fruit is prescribed for diarrhoea and dysentery. Ayurvedic texts classify bael as a cooling agent effective in treating digestive disorders linked to pitta imbalance, and its fruit pulp, often prepared as a sherbet, serves as a refreshing summer drink that prevents dehydration. The leaves hold both spiritual and medicinal significance, traditionally used in religious rituals and as a natural remedy for diabetes due to their hypoglycemic properties. Crushed leaves are applied topically to heal wounds and skin infections, reflecting their antimicrobial efficacy. The bark and roots are valued for reducing fever and inflammation, with decoctions used to treat intermittent fevers and joint pain, while the seeds exhibit anthelmintic properties against intestinal worms. Additionally, root

Volume 15, Issue 2, February 2026**|DOI: 10.15680/IJRSET.2026.1502079|**

decoctions are used for respiratory ailments such as asthma and bronchitis because of their expectorant action, and bael preparations are regarded as cardiogenic, promoting overall heart health [29-30].

VII. CONCLUSION

Aegle Marmelos (L.) Correa, commonly known as Bael, stands out as a multipurpose medicinal plant with extensive pharmacological and therapeutic potential. Every part of the plant— leaves, fruit, bark, roots, and seeds—contains diverse bioactive compounds such as alkaloids, flavonoids, phenolics, and coumarins that contribute to its wide range of pharmacological effects, including antimicrobial, antidiabetic, anticancer, antiulcer, hepatoprotective, and radioprotective activities. Scientific studies have validated many of its traditional uses described in Ayurveda, Siddha, and Unani medicine, confirming its efficacy in managing chronic diseases such as diabetes, ulcers, and cancer, as well as in promoting liver and heart health. The plant's antioxidant and anti-inflammatory properties further enhance its therapeutic value by protecting against oxidative stress and cellular damage. Despite these promising findings, further clinical and toxicological studies are required to establish standardised formulations, optimal dosages, and safety profiles. Overall, Aegle Marmelos represents a powerful natural resource with immense potential for developing novel, plant-based medicines that bridge traditional wisdom and modern pharmacological science.

REFERENCES

- 1) Dhiman S, Dahiya DP, Sharma R. Phytochemical analysis, Antioxidant and Antimicrobial Screening of Shoot Extracts of *Viola odorata* Linn. from Shikari Devi Wildlife Sanctuary, Himachal Pradesh, India. *Int J Ayur Med.* 2024 Jan;15(1):212-218. DOI: 10.47552/ijam.v15i1.4347.
- 2) Choudhary S, Chaudhary G, Kaurav H. Aegle Marmelos (Bael Patra): An ayurvedic plant with ethnomedicinal value. *Int J Res Ayurveda Pharm.* 2021 Jul;12(3):147-156.
- 3) Dahiya DP. An Updated Review on *Dicliptera bupleuroides*: Its Phytochemicals, Medicinal Use, Traditional Use, Pharmacological Activity and Toxicity. *Int J Pharm Sci (India).* 2024; 2:341-349. DOI:10.5281/zenodo.10809399. <https://support.google.com/legal/answer/3463239?hl=en>
- 4) Choudhary Y, Saxena A, Kumar Y, Kumar S, Pratap V. Phytochemistry, pharmacological and traditional uses of Aegle Marmelos. *Pharmaceutical and Biosciences J.* 2017; 20:27-33.
- 5) Das S, Sarkar A, Seth A, Gupta N, Agrawal RC. Evaluation of in-vitro antibacterial potential of ripe fruits of Aegle Marmelos. *Int J Pharm Pharma Sci.* 2012;4(3):179-81.
- 6) Gupta R, Sharma V, Singh P. Hypoglycemic activity of Aegle marmelosleaves: An updated review. *J Ethnopharmacology.* 2020; 259:112934.
- 7) Sahoo L et al. *Int J Basic Clin Pharmacol.* 2025 Mar;14(2):316-323.
- 8) Sharma N, Dubey W. History and taxonomy of Aegle marmelos: A review. *Int J Pure Appl Biosci.* 2013;1(6):7-13.
- 9) Bhar K. An Eye-Catching Review of Aegle Marmelos. (Golden Apple). 2020
- 10) Palombo EA. Phytochemicals from traditional medicinal plants used in the treatment of diarrhoea: modes of action and effects on intestinal function. *Phytother Res.* 2006 Sep;20(9):717-724
- 11) Chandrasekara A, Daugeilaite J, Shahidi F. DNA scission and LDL cholesterol oxidation inhibition and antioxidant activities of Bael (Aegle Marmelos) flower extracts. *J Trad Comp Med.* 2018;8(3):428-35.
- 12) Bhardwaj RL, Nandal U. Nutritional and therapeutic potential of bael (Aegle marmelos Corr.) fruit juice: a review. *Nutrition & Food Science.* 2015;45(6):895-919.
- 13) Dev Prakash Dahiya, Richa Kumari, Anchal Sankhyan, Anchal Sharma and Sachin Thakur Lakht-e-Zehra A, Dar NG, Saleem N, Soomro UA, Afzal W, Naqvi B, et al. Nutritional exploration of leaves, seed and fruit of bael (Aegle marmelos L.) grown in Karachi region. *Pak J Biochem Mol Biol.* 2015;48(3):61-5.
- 14) Manandhar B, Paudel KR, Sharma B, Karki R. Phytochemical profile and pharmacological activity of Aegle marmelos. *J of Integ Med.* 2018;16(3):153-63.
- 15) Kolkar KP, Malabadi RB, Sadiya MR, Chalannavar RK. Updates on some medicinal and ornamental plants- Ayurvedic medicines. *World J Adv Res and Rev.* 2024;23(1):111-47.
- 16) S Monika¹, M Thirumal¹ & PR Kumar¹ | Department of Pharmacognosy, SRM College of Pharmacy, SRM Institute of Science & Technology, Kattankulathur, Chengalpattu, Tamilnadu, 603203, India
- 17) Sharma A, Kumar R, Singh V. Phytochemical composition and biological activities of Aegle marmelos. *Front in Plant Sci.* 2022; 13:832445.

Volume 15, Issue 2, February 2026**|DOI: 10.15680/IJIRSET.2026.1502079|**

- 18)Singh N, Prasad S, Chauhan P. Toxicological evaluation of Aegle marmelos: A safety assessment. *Toxicology Reports*. 2023; 10:456-62.
- 19)Rao K, Verma S, Gupta R. Antiviral potential of Aegle marmelos against emerging pathogens. *J of Virology & Antiviral Res*. 2021;5(2):34-45.
- 20)Patil R, Rao P, Sharma S. Ayurvedic significance of Bael fruit in gastrointestinal disorders. *J Ayur Integ Med*. W2022;13(4):211-9.
- 21)Vijayakumar S. Eco-friendly synthesis of gold nanoparticles using fruit extracts and in vitro anticancer studies. *J Saudi Chem Soc*. 2019 Jun;23(6):753-761.
- 22)Gavimath CC, Ramachandra YL, Rai SP, Sudeep HV, Ganapathy PS, Kavitha BT. Antibacterial activity of Aegle marmelos Correa leaves extract. *Asian J Bio Sci*. 2008;3(2):333-336
- 23)Singh SK. Aegle marmelos protects hepatocytes from paracetamol induced hepatotoxicity. *Indian J Sci Res*. 2013;4(1):53-55. M, Kumar S, Choubey V, Maity P, Bandyopadhyay U. Apoptosis in liver during malaria: role of oxidative stress and implication of mitochondrial Guha pathway. *FASEB J*. 2006 Jul;20(8):1224-1234.
- 24)Sharma N, Dubey W. Bioactive Compounds Present in Aegle marmelos and Their Role in Medicinal Properties: A Review. *Int J Pharm Bio Sci*. 2016 Jul;7(3):170-176
- 25)Bhar K, Mondal S, Suresh P. An Eye-Catching Review of Aegle marmelos L. (Golden Apple). *Pharmacog J*. 2019;11(2):207-224.
- 26)Guha M, Kumar S, Choubey V, Maity P, Bandyopadhyay U. Apoptosis in liver during malaria: role of oxidative stress and implication of mitochondrial pathway. *FASEB J*. 2006 Jul;20(8):1224-1234.
- 27)<https://www.tataaig.com/knowledge-center/health-insurance/health-benefits-of-bael>



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details