

A Literary Study on *Bilwa* Medicinal Plant (*Aegle marmelos*) - A Nature's Gift Plant

*Vaidya Sandeep Aggarwal¹, *Dr. Suman Aggarwal², Dr. Debasis Panigrahi³, Dr. Sujit Kumar⁴, Dr. Shambhu P. Patel⁵

1. Professor and Principal, Department of *Kayachikitsa*, Vivek College of *Ayurvedic* Sciences & Hospital, Bijnor, Uttar Pradesh
 2. Assist Professor, Department of *Dravyaguna*, SKD Govt. *Ayurvedic* Medical College, Muzaffarnagar, Uttar Pradesh
 3. Professor, Department of *Dravyaguna*, Vivek College of *Ayurvedic* Sciences & Hospital, Bijnor, Uttar Pradesh
 4. Assist. Professor, Department of *Kriya Sharir*, Vivek College of *Ayurvedic* Sciences & Hospital, Bijnor, Uttar Pradesh
 5. Assist. Professor, Department of *Dravyaguna*, Vivek College of *Ayurvedic* Sciences & Hospital, Bijnor, Uttar Pradesh
- *Corresponding Author:** Vaidya Sandeep Aggarwal, Professor, Department of *Kayachikitsa*, Vivek College of *Ayurvedic* Sciences & Hospital, Bijnor, Uttar Pradesh

Abstract

Aegle marmelos, a member of the Rutaceae family with medicinal properties, is one of the most important plants in the medical field. Bilwa is used to treat a wide range of ailments. This plant has been around since the dawn of time. Because the plant produces a variety of alkaloids, all parts of the plant, including the fruit, leaves, bark, stem, and roots, are used to treat a variety of ailments. *Antianemic*, *antidiarrheal*, *antidysentric*, *antipyretic*, and *anti-inflammatory* properties are among its medicinal properties. Fruit-derived compounds have been shown to have biological promise in the treatment of anaemia, diabetes, stomach ulcers, and *hyperlipidemia*, to name a few ailments. Many studies on its medical properties and applications have been carried out, proving its significance in today's society. The architecture, distribution, nutritional impact, ayurvedic applications, and pharmacological properties of this plant are discussed in this review study.

Keywords: Ayurveda, Bilva, Pharmacological properties, Anti-anaemic, Antidysentery etc.

Introduction

Many plants have been utilised for their therapeutic qualities for thousands of years. Around 85 percent of the world's population, either completely or partially, relies on traditional medicine for basic health care. These plants are used in Ayurveda, Siddha, and other medical systems. The Rigveda, Yajurveda, Charak Samhita, and Sushruta Samhita, as well as the Astanga Hrudaya, highlight their qualities and uses for curing various diseases¹. Bilwa, commonly known as the wood apple vine, is one of them.

Bael is a holy plant in Hinduism. Leaves have been presented in prayers to Shiva and Parvati since ancient times². Trifoliate leaves with spear-shaped leaflets resemble Lord Shiva's shield, Trisula. Many stories and myths surround this tree³. Another noteworthy feature of Bael is that its Sattva component is higher in Bilwa patra, allowing it to absorb and emit Sattvika frequencies more effectively. This can result in a number of different results.

One of them is the elimination of Raja-Tama particles from the environment. When a Sattvika leaf, such as Bilwa Patra, is placed near someone who is experiencing bad emotions, the dark energy within them is reduced⁴. Antianaemic, antimicrobial, antidiabetic, anti-inflammatory, analgesic, antipyretic, hypoglycaemic, wound healing⁵ are all reported to have properties of Bael⁵.

Aim and Objective

To evaluate the study of *Bilwa Phala Majja* according to its *Antianaemic* Property.

Material and Method

The collection of data of *Bilwa (Aegle marmelos)* plant from authentic websites, various articles, literatures, Manuscripts, etc.

Plant Morphology According to Modern Science

Aegle marmelos is a slow-growing medium-sized tree with a short trunk, dense, fuzzy, flaking bark, and occasionally spiky branches that can reach a height of 12-15 metres. Young suckers frequently have stiff, straight spines. Bael is a deciduous tree with alternate leaves that are borne individually or in clusters and consist of 3-5 oval, pointed, shallowly notched leaflets that are 10 cm long and 2-5 cm thick, with a long petiole⁶.

Classification

- *Kingdom- Plantae*
- *Family- Rutaceae*
- *Subfamily- Aurantioideae*
- *Genus- Aegle*
- *Species- Marmelos*

Ayurvedic Pharmacodynamics of *Bilwa*

- *Rasa - Madhura*
- *Guna -Laghu*
- *Virya -Sheeta*
- *Vipaka- Madhura*
- *Karma – Pandu, Tridoshaghna, Shothahara, Vedanasthapana, Raktastambhan, Deepan.*

Plant Habitat and Geographical Distribution

Bael is a native of India, with the Himalayan and West Bengal areas being its most prevalent habitats. Uttar Pradesh, Chhattisgarh, Bihar, Madhya Pradesh, and Jharkhand are among the states where it grows. Bael may be found in Egypt, Malaysia, Bangladesh, and Sri Lanka, among other exotic locations⁷.

Bilwa Active Principles

Alkaloids are the most abundant and varied group of secondary plant compounds, O-3,3-(di methylallyl) halfordinol, N-2-methoxy-2-[4-(3',3'-dimethylallyloxy) phenyl] ethyl cinnamamide, and others have been isolated from the leaves of *Aegle marmelos*. The therapeutically active principles of *Bilwa* are marmelosin, skimmianine, and umbelliferone⁸.

Bilwa's Nutritive Value:

According to a physiochemical research, *Bilwa* has amazing nutritional value. *Bilwa* pulp is a rich source of glucose and sugar, and it may be made into an energy drink by mixing it with milk. Other nutrients included in *Bilwa* include proteins, lipids, fibre, calcium, minerals, iron, vitamin A, vitamin B1, vitamin C, and riboflavin. The leaves and shoots are eaten as a green vegetable in Indonesia⁹.

Bilwa's Pharmacological Properties

Antianaemic Activity: *Anaemia* can be treated by mixing powdered bael pulp with boiling cow's milk.¹⁰

Antijundice Activity:

To extract the juice, 100 soft Bael leaves were utilised. Add 10 tsp. black pepper powder to it. Take the mixture every morning and evening. After each meal, drink at least five glasses of sugarcane juice¹¹.

Antioxidant activity:

Bilwa is claimed to contain antioxidant qualities that protect the body from a variety of free radicals. According to a recent *Bilwa* research, immature fruit had a greater proportion of free radical inhibition than ripe fruit. The antioxidant activity of an aqueous extract of *Bilwa* berries was tested using DPPH radical scavenging.

Antimicrobial Action

Bacillus subtilis, *Staphylococcus aureus*, and *Enterococcus faecalis* Antibacterial activity was highest in *E. coli* and *Pseudomonas aeruginos*. *Trichophyton rubrum*, *Microsporum gypseum*, *Microsporum audounii*, *Microsporum cookie*, *Epidermophyton floccosum*, *Aspergillus niger*, *Aspergillus flavus*, and *Histoplasma capsulatum* have all been found to exhibit antifungal activity from the essential oil isolated from the leaves of the A. The antibacterial activity of different extracts was also evaluated utilising the agar well diffusion technique on the marmelos tree¹². Antimicrobial activity of hexane, cold methanol, hot methanol, and ciprofloxacin extracts against *E. coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Micrococcus luteus*, *Enterococcus faecalis*, and *Streptococcus faecalis*¹³.

Antidiarrheal Action-

The unripe fruit of the Bilwa tree is a significant diarrhoea and dysentery remedy that has been utilised by people for centuries. Bilwa has been demonstrated in several research to have antidiarrheal properties. *Shigella boydii*, *Shigella sonnei*, and *Shigella flexneri* were all resistant to the ethanolic extract, while *Shigella dysenteriae* was only moderately resistant¹⁴.

Antidiabetic Action-

Bilwa has been found to have anti-diabetic effects in numerous studies. Bilwa leaves were shown to have anti-diabetic properties in alloxan diabetic rats. Bilwa leaf methanolic extract decreases blood sugar levels. Blood sugar levels were observed to be reduced by 54 percent following 12 days of regular administration of the concentrate^{15,16}. Leaf extract has been utilised in Ayurvedic medicine to treat diabetes. Similar to insulin, it enhances the body's ability to use higher glucose loads by increasing glucose absorption¹⁷.

Anticancer Properties

Cancer is the second largest cause of mortality for both men and women in both developed and developing countries. Bilwa fruit extract is utilised to enhance the immune system, which helps the body fight cancer. According to a study, the Bilwa showed an anticancer effect in an animal model with malignancy. In preclinical investigations¹⁸, *A. marmelos* leaf extracts inhibited the growth of leukemic K562, T-lymphoid Jurkat, B-lymphoid Raji, erythroleukemic HEL, melanoma Colo38, and breast cancer cell lines MCF7 and MDA-MB-23122.

Antipyretic Properties

Using modern medication is not as effective as using natural medicine. Bilwa is an anti-pyretic that is used to relieve pain and fever. According to the Bilwa study, the Ethanolic extract significantly reduced high body temperature in a dose-dependent manner at dosages of 200 mg/kg body weight and 400 mg/kg body weight. Antipyretic efficacy was comparable to paracetamol (100 mg/kg body weight) in the extracts.^{19, 20}.

Hepatoprotective Properties-

In a study on animals, *Aegle marmelos* leaves were utilised as a control group, with four groups receiving 30 percent ethyl alcohol for 40 days. The results of the study reveal that *Aegle marmelos* leaves have a substantial hepatoprotective effect²¹.

Cardio protective Properties –

Bilwa leaf extract has been shown to protect rats against isoprenaline-induced myocardial infarction. Bilwa has also been used to treat palpitation and as a heart depressant²². Fresh Bilwa fruit juice was utilised at various dilutions for cardiotoxic operations. Bilwa's greater cardiotoxic action over digoxin is supported by new

studies. Bilwa also has antihistaminic, anti-inflammatory, insecticidal, antioxidant, immunomodulatory, wound healing activity, anticonvulsant, and antifertility activities.

Application in Ayurveda

The root is tasty and cures "Tridosha" fevers, stomach discomfort, heart palpitations, urinary problems, hypochondriasis, and "vata, pitta, and kapha" imbalances. The leaves are astringent, digestive, laxative, and expel "vata and kapha," making them useful for ophthalmology, deafness, and inflammatory therapy. The flowers are useful in the treatment of dysentery because they alleviate thirst and vomiting. Tonic, restorative, astringent, laxative, and beneficial to the heart and soul, the mature fruit is hot and dry. Morning sherbet made from ripe fruit is soft, fragrant, and refreshing, and it helps to alleviate dyspepsia. The unripe fruit can be used to treat diarrhoea and dysentery.

Mode of Action of Bilwa Phala Majja in Pandu Vyadhi –

Pandugna, Varnya, Pitta-Kaphagna, Balya, and Rasayana are the consequences of Bilwa Phala Majja. It is said to improve digestion and cleanse the strotorodha. In this illness state, the Bilwa Phala Majja functions most adaptively and contributes to the repair of dhatubala. The Ama dosha was traditionally removed using the Bilwa Phala Majja. The medicine's action is mostly determined by its subtle elements, such as Rasa, Guna, Veerya, Vipaka, Prabhava, and so on²⁴.

Discussion

Bilwa is a holy herb with a wide range of benefits. Bilwa is a toxin-fighting herb that may be used to treat a number of illnesses. In Ayurveda, it is used as an antidote for snake poison. Kashaya, Madhura, and Tikta Rasa are all present, as is Ushna Virya. As a result, the Bilwa fruit is said to be useful in cases of diarrhoea. Coumarins and sterols are two compounds with antianaemic, antimicrobial, anti-inflammatory, antipyretic, analgesic, anti-cancer, antidiabetic, and hepatoprotective properties. Bilwa is a native plant that may be utilised to cure a wide range of poisons. Toxicity may harm an organ or a system, and studies have shown that Bilwa can aid with a range of toxins-related illnesses. CCl 4 and Gentamycin, respectively, have hepatoprotective and nephroprotective effects on *Bilwa*²⁵

Antioxidant, antibacterial, and antifungal properties of Bilwa can relate to antitoxic properties. Pain and inflammation are the most common symptoms of corrosive and irritant poisoning, and Bilwa can assist with both. It also effectively protects against genotoxicity. Furthermore, activated carbon produced from Bael fruit shells was shown to be an efficient adsorbent for extracting the radioactive metal chromium from the aqueous process in a recent study.

Conclusion

Bilwa is a auspicious plant that has anti-anemia effects. Despite being aware of the medication's adverse effects, many in today's society have turned to contemporary medications for instant relief from diseases.

Although our ecology is rich in medicinal plants, some individuals are unaware of their importance. As a result, it serves as a method of informing others about what they have left behind. This item contains antianaemic, antimicrobial, antioxidant, antidiabetic, antipyretic, and anti-inflammatory properties due to the many phytochemicals contained, and it is also cost effective. But, for improved economic and productive use of goods, a systematic research and development initiative should be pursued.

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