***Phyllanthus emblica* L.**

* **Overview:** *Phyllanthus emblica*, also known as the Indian gooseberry, is a deciduous tree that belongs to the Phyllanthaceae family. It is of medium size and is classified as a monoecious tree (Dutta *et al.,* 1909).
* **Local name:**

*Sanskrit:* Amlaki (आमलकी)

*Hindi:* Amla (आमला)

*Chhattisgarhi:* Aonla (आंवला), Amla (आमला)

*English:* Indian Gooseberry

* **APG IV Classification:**

*Kingdom:* Plantae

*Clade:* Tracheophytes

*Clade:* Angiosperms

*Clade:* Eudicots

*Clade:* Rosids

*Order:* Malpighiales

*Family:* Phyllanthaceae

*Genus: Phyllanthus*

*Species: P. emblica*

* **Synonyms:**

*Cicca emblica* (L.) Kurz in Forest Fl. Burma 2: 352 (1877)

*Cicca macrocarpa* Kurz in J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 239 (1873)

*Diasperus emblica* (L.) Kuntze in Revis Gen. Pl. 2: 599 (1891)

*Diasperus pomifer* (Hook.f.) Kuntze in Revis. Gen. Pl. 2: 601 (1891)

*Dichelactina nodicaulis* Hance in W.G.Walpers, Ann. Bot. Syst. 3: 376 (1853)

*Emblica arborea* Raf. In Sylva Tellur.: 91 (1838)

*Emblica* *officinalis* Gaertn. In Fruct. Sem. Pl. 2: 122 (1790)

*Phyllanthus glomeratus* Roxb. ex Benth. in N.Wallich, Numer. List: n. o 7903 (1847), nom. nud.

*Phyllanthus mairei* H.Lev. in Bull. Geogr. Bot. 25: 23 (1915)

*Phyllanthus mimosifolius* Salisb. In Prodr. Stirp. Chap. Allerton: 391 (1796)

*Phyllanthus pomifer* Hook.f. in Brit. India 5: 289 (1887)

*Phyllanthus taxifolius* D. Don in Prodr. Fl. Nepal.: 63 (1825)

* **Geographical distribution:** This tree is frequently encountered in deciduous forests of India (Ram *et al.,* 2002), but recently there has been an increase in its cultivation in the semi-arid region and in the eastern-southeastern states of India (Nayak *et al.,* 2010).*Phyllanthus emblica* is an invaluable natural resource indigenous to India. It is predominantly found on inclines of hills and coastal regions that are situated at an elevation of 200 meters or more. The plant thrives in tropical and sub-tropical areas, including Pakistan, Sri Lanka, Malaysia, Uzbekistan, Burma, China, Southeast Asia, and Ceylon (Dey, 1896; Thakur *et al.,* 1989; Calixto *et al.,* 1998; Dnyaneshwar *et al.,* 2006; Singh *et al.,* 2008). It is grown in both flat and mountainous regions of the Kashmir valley (Rai *et al.,* 2012; Thilaga *et al.,* 2013).
* **Distribution in Chhattisgarh:** Throughout in Chhattisgarh.
* **Description:**

***(i) Stem:*** This tree is of medium size. It is deciduous in nature. The tree has a height range of 8-18 meters and features a light grey bark that peels off in small, irregular flakes (Meena *et al.,* 2010).

***(ii) Leaf:*** Leaves are simple, alternate, bifurcated, closely overlapping, subsessile, and arranged in pairs on short, deciduous branchlets. The stipules are small, lateral, and linear, and the lamina is 0.4 to 1.5 x 2-4 mm, oblong or linear-oblong, with a round base and an acute, shortly apiculate tip. The lamina is glabrous and membranous, and the nerves are not clear or obscure (Ahmad *et al.,* 2021).

***(iii) Flower:*** The flowers are unisexual, measuring 2-3 mm in diameter, and are greenish-yellow in colour. They are densely clustered in the leaf axils. The male flowers have 6 tepals that are oblanceolate and measure 1.5 mm. The tepals are obtuse in shape. There are 3 stamens with oblong anthers that are connate by their connectives and have an apiculate apex. There are 6 disc glands present. The female flowers also have 6 tepals that are oblanceolate and obtuse. The ovary is superior and measures 1.5 mm. It is 3-celled and contains 2 ovules in each cell. There are 3 styles that are broadly fimbriate, recurved, and stigmatiferous (Ahmad *et al.,* 2021).

***(iv) Fruit:*** The fruits of *Phyllanthus emblica* are drupe in form, reaching 15–20 mm in length and 18–25 mm in width. They have a nearly spherical shape with a little conic depression on both sides. The mesocarp, which is the edible part of the fruit, has a smooth and fleshy texture. It appears pale yellow to yellowish-green. As the fruit matures, the endocarp, which is the hard stone that protects the seeds, changes colour to yellowish-brown (Goyal and Bhadauria, 2008; Khan, 2009). The fruit has a fibrous texture and a flavour that can be described as astringent, bitter, and sour (Dymock, 1893; Kumar *et al.,* 2012). The seeds are typically smooth, dark brown, and usually found in groups of four to six (Gantait *et al.,* 2021).

* ***Flowering season:*** February-May
* ***Fruiting season:*** September-December
* **Importance of the tree**

***(a) Medicinal values:*** *Phyllanthus emblica* is a highly prevalent plant in Indian Ayurvedic traditions. It is commonly referred to as *"the King of Rasayana"* on account of its astonishing capacity to rejuvenate, revitalise, and repair (Singh *et al.,* 2012; Mirunalini *et al.,* 2013). In the ancient Ayurvedic medical literature from 500 BC, it is referred to as *“Charak Smitha.”* In addition to being utilised in Indian Ayurveda, it is additionally used in the Unani medical system. Phyllanthus emblica is an exceptionally beneficial plant that can serve as a significant nutritional supply of amino acids, vitamin C, and minerals (Ahmad *et al.,* 2021). The entire plant—all of its parts—can be administered therapeutically; specifically, the fruit, known as *“Rasayana,”* has been utilised in Ayurveda as a strong rejuvenator. The fruit has also been utilised in conventional medicine to treat jaundice, diarrhoea, and inflammation. In addition, many components of plants have demonstrated antibacterial, antioxidant, antidiabetic, hypolipidemic, antiulcerogenic, gastroprotective, hepatoprotective, and chemopreventive characteristics (Mirunalini and Krishnaveni, 2010).

The *Phyllanthus* genus has been thoroughly examined as a herbal drug in Southeastern Asian countries, as well as in Brazil and India. Chinese traditional medicine has employed *Phyllanthus emblica* for treating sore throat, hypertension, dropsy, and hepatitis B, while in African traditional medicine, it is used to address malaria, jaundice, and renal calculus. In addition, the plant's potential in combating HIV, HBV, and cancer has sparked considerable interest among researchers (Mao *et al.,* 2016). Moreover, *Phyllanthus emblica* is utilised for its therapeutic properties in improving memory, treating respiratory, cutaneous, and ocular ailments, as well as detoxifying substances such as snake venom (Ahmad *et al.,* 2021). ***“Triphala”*** is a traditional herbal formulation that is used in Thailand. It is comprised of *Phyllanthus emblica*, *Terminalia bellirica* (Gaertn.) Roxb., and *Terminalia chebula* Retz (Phetkate *et al.,* 2012). This paste made from the fruit of the Phyllanthus emblica plant is effective in treating headaches. The cooling effect of *Phyllanthus emblica's* fruit pulp was demonstrated in a study conducted in Indonesia. When administered immediately to the forehead, a combination of *Phyllanthus emblica* fruit paste and buttermilk is effective in relieving migraines. According to Unani medicine, the fruit of the *Phyllanthus emblica* plant is referred to as ***"Irtifal,"*** which is equivalent to the name ***"Triphala"*** (Ahmad *et al.,* 2021).

In India, ripe and matured fruits are frequently employed as an everyday digestive and are also exported to other nations. In these countries, the fruits are preserved with sugar and used as a digestive aid specifically for children (Thakur *et al.,* 1989). Tibetan medicine has a long-standing history of using *Phyllanthus emblica* fruit. Tibetans also acknowledged the fruit's ability to reduce heat and its acidic character, leading them to see it as a sedative, a fever-reducing agent, and beneficial for managing issues related to urine and thinning hair (Mehmood *et al.,* 2013). The fruit's cooling qualities amplify its impact on anxiousness (Tsarong, 1994). *Phyllanthus emblica* fruits are employed in the treatment of diarrhoea, while a combination of the fruit with sour milk is beneficial for individuals suffering from dysentery (Chaudhuri, 2002). *Phyllanthus emblica* has the ability to reinstate regular breathing. A concoction consisting of the fruit and seeds of *Piper nigrum*, the fruits of *Terminalia chebula*, and garlic, all blended with cow's ghee, aids in the recovery of normal breathing capacity (Chaudhuri, 2002). Fresh *Phyllanthus emblica* fruits are used as a remedy for lung inflammations in Turkey. Cough, asthma, and other respiratory issues are treated with a fruit juice, honey, and pipit amalgamation (Mehmood *et al.,* 2011). To alleviate a sore throat, it is recommended to consume a mixture of *Phyllanthus emblica* powder or juice and warm milk three times a day. The mixture should consist of one teaspoon of *Phyllanthus emblica* powder or juice combined with a glass of warm milk. Moreover, including ghee into this mixture aids in alleviating cough symptoms. To alleviate dry coughs, a remedy involves combining *Phyllanthus emblica* powder with honey and consuming it twice daily. In addition, *Phyllanthus emblica* formulations can also be used to treat various breathing-related conditions such as bronchitis, TB, and asthmatic symptoms (Lim *et al.,* 2016). Migraine is a condition that tends to affect women more frequently than men. This type of headache is a highly intense vascular condition. Relief can be achieved by applying a paste made from dried *Phyllanthus emblica* powder, rose water, Neel kamal, and Kumkum (Vasant *et al.,* 2014). *Phyllanthus emblica* and honey together has been found to have a positive impact on vision. Tablets of this type of traditional medicine are created by combining ***“Trifala”*** and *Opium* poppy (Doda content) with opium juice. The medications are placed over the closed eyes and then bandaged. This combination is recognised for its ability to alleviate eye discomfort. A study was conducted in the field of ophthalmology, where various plants were used to create a herbal eye drop formulation. The study utilised a variety of plants, such as *Phyllanthus emblica*, *Terminalia bellerica, Rosa damascene, Cinnamomum camphora, Meldespum apum, Carumc opticum, Ocimum sanctum,* and *Curcuma longa*. Conjunctivitis, postoperative cataract, acute dacryocystitis, xerosis, and conjunctival degenerative conditions. There was observed improvement without any adverse reactions in it. *Phyllanthus emblica* demonstrates strong antibacterial properties, making it effective in combatting ailments and enhancing immunity against organisms that cause illness (Shah, 2017). Frequent consumption of alcohol, specific antibiotics, painkillers, and other medications can lead to the accumulation of toxins in the liver. *Phyllanthus emblica* is known for its detoxifying properties, aiding in the purification of blood by eliminating toxins and providing protection to the liver (Singh *et al.,* 2008). Malfunctions in uric acid metabolism can lead to the accumulation of the acid and its salts in joints and blood, causing gout, which is characterised by inflammation in the big toe. A potential treatment for this condition involves the use of *Phyllanthus emblica* juice combined with aged ghee. This amalgamation has been found to have a beneficial effect on joint health and may provide relief for individuals suffering from gout. This method is also effective in treating spots caused by smallpox, chickenpox, and measles. A mixture of *Phyllanthus emblica* juice, milk, honey, and ghee has been found to be effective in treating chronic piles. The treatment for piles is to consume this combination after lunch (Vasant *et al.,* 2014). In addition to being a well-known antioxidant, *Phyllanthus emblica* is also an essential component in the process of lightening the complexion (Williamson, 2002). The fruit of *Phyllanthus emblica* has traditionally been utilised in traditional medicine to extract oil, which aids in the nutrition and fortification of the hair. The oil also aids in sanitation and is highly esteemed for its efficacy. As a result, it is an appropriate component in hair oils and shampoo-like treatments (Dey, 1896). In addition, the fruits of *Phyllanthus emblica* not only promote hair growth but also serve as an effective conditioner when combined with coconut oil. In this particular situation, the fruit of *Phyllanthus emblica* is heated along with coconut oil and left until it hardens and gets scorched. This mixture is then utilised to prevent the occurrence of grey hair. To combat greasy hair, combine half a cup of *Phyllanthus emblica* juice with half a cup of lime juice and water. This mixture serves as an effective anti-grease agent. The water infused with *Phyllanthus emblica* fruits may be utilised as a last rinse during shampooing due to its hair-fortifying and rejuvenating abilities (Kumar *et al.,* 2012). The oil derived from the leaves of *Phyllanthus emblica* is utilised in the production of fragrances. In addition, a combination of roasted and crushed seeds with oil can be utilised as a remedy for both itching and scabies (Mehmood *et al.,* 2011). In addition, fresh fruits possess exceptional properties as carminative, refrigerant, stomachic, and diuretic agents. In Persia, the juice of the fruit is utilised as a vermifuge (Jayaweera, 1981). *Phyllanthus emblica* is utilised by complexion-whitening businesses in Europe, the Middle East, and Asia to specifically address blemishes as well as age-related pigmentation (Drury, 1873). *Phyllanthus emblica* has therapeutic properties for several illnesses and conditions. It may be utilised to eliminate or treat acne, particularly when it occurs on the facial area. To achieve this objective, a blend of *Phyllanthus emblica* and *Azadirachta indica* is utilized (Vasant *et al.,* 2014). Additionally, it can be utilised as an agent for rinsing (Vasant *et al.,* 2014). Additionally, *Phyllanthus emblica* powder can be utilised as a means to break down stones. When combined with radish, it proves to be effective in dissolving kidney stones and facilitating elimination through urination (Shah, 2017). Studies have demonstrated that a combination of Phyllanthus emblica powder, sugar, and either milk or water, when consumed twice daily, can effectively act as an acid neutraliser. Acidity typically occurs as a result of an imbalanced diet and an excessive consumption of greasy, sugary, spicy, or acidic food. *Phyllanthus emblica* juice restores the pH balance of urine and alleviates the discomfort caused by infections (Singh *et al.,* 2008). *Phyllanthus emblica* is rich in vitamin C (asocorbic acid), which enables it to effectively absorb iron and alleviate iron deficiency (Scartezzini *et al.,* 2006). *Phyllanthus emblica* has the ability to enhance sperm count in males and alleviate leucorrhea in females. To alleviate this leucorrhea condition, it is recommended to consume a daily mixture of 3 grammes of *Phyllanthus emblica* powder and 6 grammes of honey for a duration of a month (Anila and Vijayalakshmi, 2002). *Phyllanthus emblica* has potential applications in the field of wound healing. The application of a paste made from the decaying bark of *Phyllanthus emblica* has been found to possess wound-healing properties. Applying this paste once a day for 2-3 days will produce the desired effects. In addition, the milky juice derived from the leaves of *Phyllanthus emblica* has been found to effectively alleviate sores and treat scurvy (Biswas *et al.,* 2001; Anila and Vijayalakshami, 2002). *Phyllanthus emblica*, commonly known as ***"Amla churna,"*** is an Indian Ayurvedic product that has been found to have memory-enhancing properties (Vasudevan and Parle, 2007a, 2007b). Additionally, *Phyllanthus emblica* has the potential to be utilised as a larvicidal and mosquito-killing agent (JEYASANKAR AND ELUMALAI, 2012). Extraction of *Phyllanthus emblica, Aloe vera, Hibiscus rosa-sinensis, Azadirachta indica, Acacia concinna, Glycyrrhiza glabra, Sapindus mukorossi,* and *Eclipta prostrata* were utilised in the preparation of shampoo (Arora *et al.,* 2019).

***(b) Ethnobotanical values***: *Phyllanthus emblica* has potential as an ingredient in meals due to its high nutritional value**.** In addition to their health advantages, the immature green fruits are used in pickles as a means of stimulating the appetite (Tsarong, 1994). The mature fruits are also utilised to create freshly squeezed juice and are beneficial during the summer season (Mirunalini and Krishnaveni, 2010). Fruit is utilised in gastronomy for the preparation of pickles, chutney, preservatives, and as an ingredient in various vegetable-based dishes (Perry and Metzger, 1980; Deokar, 1998). Fruit is utilised in the production of murabbah, a process that involves immersing ripe fruits in a concentrated sugary syrup for an extended duration, allowing the fragrance of the fruits to infuse into the syrup (Mirunalini and Krishnaveni, 2010). The resilient red wood, which is both durable and pliable, is prone to warping and splitting. It is commonly utilised in small building, furniture making, tool production, gunstock crafting, as well as the creation of hookahs and regular pipes. The wood of Phyllanthus emblica was employed to mitigate the water's hardness. In this way, the wood can be employed in rural areas as a cost-effective method of water purification (Kannan and Mani, 2014). On the other hand, as an alternative to anthracite, crushed fruit shells can be utilised in rapid gravity sand filters for the purpose of water purification. There is no decomposition of these shells in water, and they do not impart any flavour, odour, or colour to the water (Saini *et al.,* 2022). The addition of Amla to processed ice cream increased its resistance to melting and decreased the amount of air incorporated, thus enhancing its functional properties and dietary value (Goraya and Bajwa, 2015). In Thailand and India, the tannin-rich bark, together with the immature fruit and leaves, are highly prized and frequently used in conjunction with other tanning materials, including beleric myrobalan (*Terminalia bellirica*) and chebulic myrobalan (*Terminalia chebula*). The bark of the twig is highly valued for its ability to brown leather. Leaves and fruits are used as animal feed, while leaves may also be employed as organic fertiliser. A crucial oil is extracted from the leaves for use in the production of perfumes. The leaves and young fruit are used for colouring flooring, bamboo wickerwork, silk, and wool, resulting in light-brown or yellow-brown shades. The fruits are used in the manufacture of black ink and hair dye (Lim and Lim, 2012).

Fruits are frequently baked in tarts. Indian housewives often prepare fruits with sugar and saffron, serving one or two to their children each morning. In Indonesia and Malaysia, the fruit is commonly used as a sour seasoning in sambal and sayor, serving as a substitute for tamarind pulp. In Thailand, the fruit is commonly consumed by local Thais to hydrate themselves while exploring the forest. In China, there is a popular beverage called phyllanthus drink that is made from fruit extract. Furthermore, a wine made from the same fruit extract is available for consumption in the market (Lim and Lim, 2012).

***(c) Cultural values:*** In Hinduism, amla is revered as a holy tree that is venerated as a representation of Mother Earth. The tale surrounding the myrobalan (*Phyllanthus emblica*), serves to emphasise its sacredness to the three major Hindu deities: ***“Vishnu, Brahma, and Shiva.”*** On a certain occasion, when all the deities and sages (rishi) had gathered at the sacred site of Prabhasa, Devi, the divine energy of Shiva, expressed her desire to offer adoration to Vishnu, while Lakshmi expressed her desire to worship Shiva. Profoundly moved, their eyes filled with tears of happiness. Amalaka trees sprang from the very spots where tears landed, since they originated from tears. The amalaka tree was witnessed by all the gods and sages as the embodiment of Brahma, Vishnu, and Shiva (Elgood, 2000).

***(d) Ethical values:*** The exceptional curative and replenishing properties that it possesses, the plant known as *Phyllanthus emblica* has been utilised for centuries in virtually all traditional medical systems utilised all over the world. Studies conducted in the woodlands around rural settlements in India have revealed that the genetic diversity in subpopulations of Phyllanthus emblica is being adversely affected or is at risk of a future constraint as a result of excessive fruit picking (Padmini *et al.,* 2001; Geethika *et al.,* 2018). Recent years have seen an upsurge in the demand for the fruit, mostly driven by a revival in the worldwide herbal industry. It is worth noting that the vast majority of fruit harvesting remains illegal (Spots, 2011).

* **References**

1. Ahmad, B., Hafeez, N., Rauf, A., Bashir, S., Linfang, H., Rehman, M. U., ... & Rengasamy, K. R. (2021). Phyllanthus emblica: A comprehensive review of its therapeutic benefits. *South African journal of botany*, *138*, 278-310.
2. Anila, L., & Vijayalakshmi, N. (2002). Flavonoids from Emblica officinalis and Mangifera indica—effectiveness for dyslipidemia. *Journal of Ethnopharmacology*, *79*(1), 81-87.
3. Arora, R., Singh, R. K., & Meenakshi, B. (2019). Formulation and evaluation of herbal shampoo by extract of some plants. The Pharmaceutical and Chemical Journal, 6(4), 74-80.
4. Biswas, N. R., Gupta, S. K., Das, G. K., Kumar, N., Mongre, P. K., Haldar, D., & Beri, S. (2001). Evaluation of Ophthacare® eye drops—a herbal formulation in the management of various ophthalmic disorders. *Phytotherapy Research*, *15*(7), 618-620.
5. Calixto, J. B., Santos, A. R., Filho, V. C., & Yunes, R. A. (1998). A review of the plants of the genus Phyllanthus: their chemistry, pharmacology, and therapeutic potential. *Medicinal research reviews*, *18*(4), 225-258.
6. Chaudhuri, R. K. (2002). Emblica cascading antioxidant: a novel natural skin care ingredient. *Skin Pharmacology and Physiology*, *15*(5), 374-380.
7. Deokar, A. B. (1998). Medicinal plants grown at Rajegaon. *Pune: DS Manav Vikas Foundation. p*, 48-49.
8. Dey, K. L. (1896). *The Indigenous Drugs of India..*. Thacker, Spink.
9. Dnyaneshwar, W., Preeti, C., Kalpana, J., & Bhushan, P. (2006). Development and Application of RAPD-SCAR Marker for Identification of Phyllanthus emblica L INN. *Biological and Pharmaceutical Bulletin*, *29*(11), 2313-2316.
10. Drury, H. (1873). The useful plants of India: With notices of their chief value in commerce, medicine, and the arts. WH Allen.
11. Dutta, S., Upadhaya, D., & Kazi, R. (1909). Typification of Phyllanthus emblica Linnaeus. *Bull. Bur. Pl. Industr. USDA*, *148*(17).
12. Dymock, W. (1893). *Pharmacographia indica* (Vol. 3).
13. Elgood, H. (2000). Hinduism and the religious arts. *Hinduism and the Religious Arts*, 1-256.
14. Gantait, S., Mahanta, M., Bera, S., & Verma, S. K. (2021). Advances in biotechnology of Emblica officinalis Gaertn. syn. Phyllanthus emblica L.: a nutraceuticals-rich fruit tree with multifaceted ethnomedicinal uses. *3 Biotech*, *11*(2), 62.
15. Geethika, E., Triveni, H. N., Srirama, R., Siva, R., Setty, S., & Ravikanth, G. (2018). Development and characterization of microsatellite markers for Phyllanthus emblica Linn., important nontimber forest product species. Journal of genetics, 97, 1001-1006.
16. Goraya, R. K., & Bajwa, U. (2015). Enhancing the functional properties and nutritional quality of ice cream with processed amla (Indian gooseberry). Journal of food science and technology, 52, 7861-7871.
17. Goyal, D., & Bhadauria, S. (2008). In vitro shoot proliferation in Emblica officinalis var. Balwant from nodal explants.
18. Jayaweera, D. M. A. (1981). Medicinalplants used in Ceylon Part III. National Science Council of Sri Lanka.
19. JEYASANKAR, A., & ELUMALAI, K. (2012). Larvicidal activity of Phyllanthus emblica Linn.(Euphorbiaceae) leaf extracts against important human vector mosquitoes (Diptera: Culicidae). Asian pacific journal of Tropical Disease, 2, S399-S403.
20. Kannan, D., & Mani, N. (2014). Removal of hardness (Ca2+, Mg2+) and alkalinity from ground water by low cost adsorbent using Phyllanthus emblica wood. Int J Chem Pharm Anal, 1(4), 208-212.
21. Khan, K. H. (2009). Roles of Emblica officinalis in medicine-A review. *Bot Res Int*, *2*(4), 218-228.
22. Kumar, K. S., Bhowmik, D., Dutta, A., Yadav, A. P., Paswan, S., Srivastava, S., & Deb, L. (2012). Recent trends in potential traditional Indian herbs Emblica officinalis and its medicinal importance. Journal of Pharmacognosy and Phytochemistry, 1(1), 24-32.
23. Lim, T. K., & Lim, T. K. (2012). Phyllanthus emblica. *Edible Medicinal And Non-Medicinal Plants: Volume 4, Fruits*, 258-296.
24. Lim, D. W., Kim, J. G., & Kim, Y. T. (2016). Analgesic effect of Indian gooseberry (emblica officinalis fruit) extracts on postoperative and neuropathic pain in rats. Nutrients, 8(12), 760.
25. Mao, X., Wu, L. F., Guo, H. L., Chen, W. J., Cui, Y. P., Qi, Q., ... & Zhang, L. Z. (2016). The genus Phyllanthus: an ethnopharmacological, phytochemical, and pharmacological review. Evidence‐based Complementary and Alternative Medicine, 2016(1), 7584952.
26. Meena, A. K., Singh, A., & Rao, M. M. (2010). Evaluation of physicochemical and preliminary phytochemical studies on the fruit of Emblica officinalis Gaertn. Asian Journal of Pharmaceutical and Clinical Research, 3(3), 242-43.
27. Mehmood, M. H., Rehman, A., Rehman, N. U., & Gilani, A. H. (2013). Studies on prokinetic, laxative and spasmodic activities of Phyllanthus emblica in experimental animals. *Phytotherapy research*, *27*(7), 1054-1060.
28. Mehmood, M. H., Siddiqi, H. S., & Gilani, A. H. (2011). The antidiarrheal and spasmolytic activities of Phyllanthus emblica are mediated through dual blockade of muscarinic receptors and Ca2+ channels. Journal of Ethnopharmacology, 133(2), 856-865.
29. Mirunalini, S., & Krishnaveni, M. (2010). Therapeutic potential of Phyllanthus emblica (amla): the ayurvedic wonder. *Journal of basic and clinical physiology and pharmacology*, *21*(1), 93-105.
30. Mirunalini, S., Vaithiyanathan, V., & Krishnaveni, M. A. N. I. (2013). Amla: a novel ayurvedic herb as a functional food for health benefits-a mini. Int J Pharma Pharmaceut Sci, 5.
31. Nayak, P., Behera, P. R., Thirunavoukkarasu, M., & Chand, P. K. (2010). High frequency plant regeneration through adventitious multiple shoot organogenesis in epicotyl explants of Indian gooseberry (Emblica officinalis Gaertn). *Scientia horticulturae*, *123*(4), 473-478.
32. Padmini, S., Rao, M. N., Ganeshaiah, K. N., & Shaanker, R. U. (2001). Genetic diversity of Phyllanthus emblica in tropical forests of South India: impact of anthropogenic pressures. Journal of Tropical Forest Science, 297-310.
33. Perry, L. M., & Metzger, J. (1980). Medicinal plants of East and Southeast Asia: attributed properties and uses.
34. Phetkate, P., Kummalue, T., U-pratya, Y., & Kietinun, S. (2012). Significant increase in cytotoxic T lymphocytes and natural killer cells by triphala: A clinical phase I study. Evidence‐Based Complementary and Alternative Medicine, 2012(1), 239856.
35. Rai, N., Tiwari, L., Sharma, R. K., & Verma, A. K. (2012). Pharmaco-botanical profile on emblica officinalis Gaertn. *A pharmacopoeial herbal drug. STM Journals*, *1*(1), 29-41.
36. Ram, M. S., Neetu, D., Yogesh, B., Anju, B., Dipti, P., Pauline, T., ... & Selvamurthy, W. (2002). Cyto-protective and immunomodulating properties of Amla (Emblica officinalis) on lymphocytes: an in-vitro study. *Journal of ethnopharmacology*, *81*(1), 5-10.
37. Saini, R., Sharma, N., Oladeji, O. S., Sourirajan, A., Dev, K., Zengin, G., ... & Kumar, V. (2022). Traditional uses, bioactive composition, pharmacology, and toxicology of Phyllanthus emblica fruits: A comprehensive review. *Journal of ethnopharmacology*, *282*, 114570.
38. Scartezzini, P., Antognoni, F., Raggi, M. A., Poli, F., & Sabbioni, C. (2006). Vitamin C content and antioxidant activity of the fruit and of the Ayurvedic preparation of Emblica officinalis Gaertn. Journal of ethnopharmacology, 104(1-2), 113-118.
39. Shah, N. C. (2017). Phyllanthus emblica (Emblica officinalis): An important medicinal & commercial fruit of India-Part IV. *Life Science Research*, *1*(10), 14-23.
40. Singh, D. P., Govindarajan, R., & Rawat, A. K. S. (2008). High‐performance liquid chromatography as a tool for the chemical standardisation of Triphala—an Ayurvedic formulation. *Phytochemical Analysis: An International Journal of Plant Chemical and Biochemical Techniques*, *19*(2), 164-168.
41. Singh, E., Sharma, S., Pareek, A., Dwivedi, J., Yadav, S., & Sharma, S. (2012). Phytochemistry, traditional uses and cancer chemopreventive activity of Amla (Phyllanthus emblica): The Sustainer. Journal of Applied Pharmaceutical Science, (Issue), 176-183.
42. Spots, G. H. (2011). Genetic resources of Phyllanthus in Southern India. Phyllanthus Species: Scientific Evaluation and Medicinal Applications, 97.
43. Thakur, R. S., Puri, H. S., & Husain, A. (1989). *Major medicinal plants of India*. Central Institute of Medicinal and Aromatic Plants.
44. Thilaga, S., Largia, M. J. V., Parameswari, A., Nair, R. R., & Ganesh, D. (2013). High frequency somatic embryogenesis from leaf tissue of'Emblica officinalis' Gaertn.-A high valued tree for non-timber forest products. *Australian Journal of Crop Science*, *7*(10), 1480-1487.
45. Tsarong, T. J. (1994). Tibetan Medicinal Plants Tibetan Medical Publications. *India ISBN*.
46. Vasant, B. S., Bhaskarrao, D. A., & Bhanudas, S. R. (2014). Emblica officinalis-the wonder of Ayurvedic medicine.
47. Vasudevan, M., & Parle, M. (2007a). Effect of Anwala Churna (Emblica officinalis G AERTN.): An Ayurvedic preparation on memory deficit rats. Yakugaku Zasshi, 127(10), 1701-1707.
48. Vasudevan, M., & Parle, M. (2007b). Memory enhancing activity of Anwala churna (Emblica officinalis Gaertn.): An Ayurvedic preparation. Physiology & behavior, 91(1), 46-54.
49. Williamson, E. M. (2002). Major Herbs of Ayurveda. Churchill Livingstone. *Edimburgh: Elsevier Science Limited*.

**URL:**

[Phyllanthus emblica L. | Plants of the World Online | Kew Science](https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:353838-1)

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