

A Review Article on Pharmacognostic Study of Mangifera indica

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Abstract:

The review article comprises of pharmacognostic study of *Mangifera indica* known as the mango, Aam, it has been an important herb in the Ayurvedic and indigenous medical systems for over 4000 years. Different part of plants can be used for multiple purposes. Fruit, leaves, seed, pulp, bark and root almost any part of plant used for medicinal purpose. Mangoes belong to genus *Mangifera* which consists of about 30 species of tropical fruiting trees in the flowering plant family Anacardiaceous. It is a traditional drug and has wide range of pharmacological activities including antioxidant, antilipid, immunomodulator, cardiogenic, and hypotensive, wound healing, antidegenerative and antidiabetic activities. Mangoes are a rich source of vitamin A, C and D.

Keywords: Herb, traditional drug, cardiogenic, hypotensive, wound healing, antioxidant.

1. INTRODUCTION:

Mangoes belong to genus *Mangifera* which consists of about 30 species of tropical fruiting trees in the flowering plant family Anacardiaceae. *M. indica* is a fruit tree which has been actively moved by humans for centuries. It is widely cultivated for commercial fruit production, as a garden tree, and as shade tree in many tropical and subtropical regions of the world. This species has adapted to a wide variety of climates where it has become naturalized. Because fruits are eaten and dispersed by bats, hornbills, monkeys, elephants, raccoons, porcupines, and humans, it has easily escaped from cultivation and established in natural areas. Leaves and bark

are rich in mangiferin, mangiferolic acid and indicinol. Young leaves contain tannins, flavanoids, steroids, cardiac glycosides, alkaloids and carbohydrates.



1.1 DISTRIBUTION: The natural distribution of *M. indica* is in the Indo-Malaysian region, specifically India and Myanmar. Wild populations can be found in the Assam-Chittagong Hills in India and in Myanmar. This species has become naturalized throughout the tropics and subtropics and much of its spread and naturalization has occurred associated with expansion of human populations.

Due to its delicious fruits, *Mangifera indica* has been widely disseminated throughout the tropics in the last two centuries. It is probable that the Portuguese carried the mango from India to Africa and later to South America. By the 18th century it was found growing throughout the West Indies and on the mainland of Central America. It is now found in all the tropical and subtropical regions such as the Canary Islands, Madeira, along the shores of the Mediterranean, Australia, the Persian Gulf region, southern Brazil and southern U.S.A.

1.1 HISTORY: Buddhist monks are believed to have moved the mango on voyages to Malaya and eastern Asia in the fourth and fifth centuries. The Persians carried it to East Africa around the tenth century. Mango was commonly grown in India before the earliest visits of the

Portuguese who apparently introduced it to West Africa early in the sixteenth century and later to Brazil in the seventeenth and eighteenth centuries. After becoming established in Brazil, the mango was carried to the West Indies, where it was first planted in Barbados about 1742 and later in the Dominican Republic. It reached Jamaica about 1782 and, by the eighteenth century it was also found growing on the mainland of Central America. By 1833 it is also recorded in Mexico, in the Yucatan Peninsula.

1.2 HABITAT: *M. indica* grows from sea level up to 1200 m in wet valleys, riversides, coastal forests and natural grasslands. It also thrives in open and disturbed areas along roadsides, pastures, and secondary wet and dry forests.

1.3 TAXONOMICAL CLASSIFICATION:

Domain: Eukaryota

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Dicotyledonae

Order: Sapindales

Family: Anacardiaceae

Genus: *Mangifera*

Species: *Mangifera indica*

1.4 BOTANICAL DESCRIPTION:

SYNONYMS:

Sanskrit: Ambrah; Madhuulii; Madhuula; Madhuulaka

English: Mango;

Hindi: Aam;

French: Mangot; mangue; manguier;

Portuguese: Manga; manguera;

Tamil: Ambiram; Mambazham; Mambalam; Mangai;

Punjabi: Amb; Wawashi;

Gujarati: Ambo, Keri; Marvo (unripe);

Marathi: Amchur; Amba

MORPHOLOGY: The trees may reach 40 m or more in height and live for several hundred years. They bear rosette of evergreen leaves (red or yellow at first) and dense panicles up to 30 cm long of small (5 to 10 mm) reddish or yellowish flowers. In deep soil, the tap root descends to a depth of 20 ft (6 in), the profuse, wide-spreading, feeder root system also sends down many anchor roots which penetrate for several feet. Trunk stout, 90 cm in diameter, bark brown, with many thin fissures, thick, becoming darker, rough and scaly or furrowed, branchlets rather stout, pale green and hairless. Inner bark light brown and bitter. Whitish latex exudes from cut twigs and a resin from cuts in the trunk.

The fruits, which range from 2.5 cm to more than 30 cm in length, depending on the cultivar, vary in shape (from round to oval, egg-shaped, or kidney-shaped) and color (green, yellow, and red, purple) with a dotted skin. Single mature mango tree can produce 2000 to 2500 ripe fruits **petiole:** 2-6 cm, grooved apically, inflated basally **Leaf blade** Oblong to oblong-lanceolate, 12-30 × 3.5-6.5 cm, alternate, leathery, deep green adaxially, glabrous on both sides, base cuneate to obtuse, margin entire, undulate, apex acute to long acuminate, lateral veins 20-25 pairs, midrib prominent on both sides, reticulate venation obscure. The leaves are

spirally arranged on branches, linear-oblong, lanceolate, elliptical, pointed at both ends, the leaf blades mostly about 25-cm long and 8-cm wide, sometimes much larger, reddish and thinly flaccid

Leaves are alternate, simple, leathery, oblong-lanceolate, 16-30 x 3-7 cm, on flowering branches, up to 50 cm on sterile branches, curved upward from the midrib and sometimes with edges a little wavy, **Young leaves** red, aging to shiny dark green above, lighter below, with pale and conspicuous midrib, yellow or white venation; petioles 4.5 cm long, striate and swollen at the base. Full-grown leaves may be 4 to 12.5 in (10-32 cm) long and 3/4 to 2 1/8 in (2-5.4 cm) wide. **The inflorescence** occurs in panicles consisting of about 3000 tiny whitish-red or yellowish – green flowers. A much-branched panicle bearing many very small (4 mm) greenish-white or pinkish flowers.

The fruit is a well known large drupe, but shows a great variation in shape and size. It contains a thick yellow pulp, single seed and thick yellowish – red skin when ripe. **The seed** is solitary, ovoid or oblong, encased in a hard, compressed fibrous endocarp.

Flowers : Hundreds and even as many as 3,000 to 4,000 small, yellowish or reddish flowers, 25% to 98% male, the rest hermaphroditic, are borne in profuse.

Petals: Light yellow with prominent red tree-shaped pattern adaxially, oblong or oblong-lanceolate, 3.5-4 × ca. 1.5 mm, glabrous, recurved at anthesis, fertile stamen 1, ca. 2.5 mm, with ovate anther; staminodes 4, 0.7-1 mm. Disk inflated, fleshy, 5-lobed. Ovary oblique, ovate, ca. 1.5 mm in diam. at anthesis; Style: 2.5 mm, eccentric. The flower has a conspicuous 5-lobed disc between the petals and stamens. **Calyx:** yellow-green, very short, deeply 5-lobed; 5 sepals, each 2-2.5 mm long x 1-1.5 mm broad, green with whitish margin, or yellowish-green, hairy outside.

The skin is leathery, waxy, smooth, fairly thick, aromatic and ranges from light-or dark-green to clear yellow, yellow-orange, yellow and reddish-pink, or more or less blushed with bright-or dark-red or purple-red, with fine yellow, greenish or reddish dots, and thin or thick whitish, grey or purplish bloom, when fully ripe. Some have a "turpentine" odor and flavor, while others are richly and pleasantly fragrant. The flesh ranges from pale-yellow to deep-orange. It is essentially peach-like but much more fibrous (in some seedlings excessively so-actually "stringy"); is extremely juicy, with a flavor range from very sweet to sub acid to tart. There is a single, longitudinally ribbed, pale yellowish-white, somewhat woody stone, flattened, oval or kidney- shaped, sometimes rather elongated.

TRADITIONAL MEDICINES: In ayurveda, it is used in a Rasayana formula, clearing digestion and acidity due to pitta (heat), sometimes with other mild sours and shatavari (*Asparagus racemosus*) different parts of the mango tree, both as food and medicine. It is anti-diuretic, anti-diarrheal, anti-emetic and cardiac herb.

PHYTOCHEMISTRY: Mango peel pigment may have biological effect including carotenoids such as the provitamins. A compound, beta-carotene, lutein and alpha-carotene, polyphenols such as quercetin, kaempferol, Gallic acid, caffeic acid, catechins, tannins, and the unique mangoxanthone, mangiferin, which are under preliminary research for their potential to counteract various disease processes.

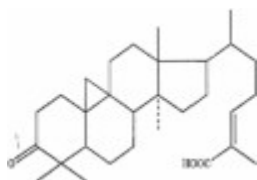
The different chemical constituents of the plant, especially the polyphenolics, flavonoids, triterpenoids. Mangiferin a xanthone glycoside major bio-active constituent, isomangiferin, tannins & gallic acid derivatives.

The bark is reported to contain protocatechic acid, catechin, mangiferin, alanine, glycine, γ -

aminobutyric acid, kinic acid, shikimic acid and the tetracyclic triterpenoids cycloart-24-en-3 β ,26-diol, 3-ketodammar-24 (*E*)-en-20S,26-diol, C-24 epimers of cycloart-25 en 3 β ,24,27-triol and cycloartan-3 β ,24,27-triol.

Structure of Mangiferin:

Indicoside A and B, manghopanal, mangoleanone, friedelin, cycloartan- 3 β -30-diol and derivatives, mangsterol, manglupenone, mangocoumarin, n-tetacosane, n-heneicosane, n-triacontane and mangiferolic acid methyl ester and others isolated from stem bark Mangostin, 29-hydroxy mangiferonic acid and mangiferin have been isolated from the stem bark together with common flavonoids. The flower yields alkyl gallates such as gallic acid, ethyl gallate, methyl gallate, n-propyl gallate, n-pentyl gallate, n-octyl gallate, 4-phenyl gallate, 6-phenyl-n-hexyl gallate and dihydrogallic acid. Root of mango contains the chromones, 3-hydroxy-2-(4'-methylbenzoyl)-chromone and 3-methoxy-2-(4'-methyl benzoyl)- chromone. The leaf and flower yield an essential oil containing humulene, elemene, ocimene, linalool, nerol and many others. The fruit pulp contains vitamins A and C, β -carotene and xanthophylls. An unusual fatty acid, cis-9, cis-15-octadecadienoic acid was isolated from the pulp lipids of mango. Phenolic antioxidants, free sugars and polyols isolated and analyzed from Mango stem bark. All structures are elucidated by ES-MS and NMR spectroscopic methods.



Structure of Mangiferonic acid

Quantitative analysis of the compounds has been performed by HPLC, and mangiferin was

found to be the predominant component.

HPLC method has been developed to determine carotenoids in Taiwanese mango. 5-alkyl- and 5-alkenylresorcinols, as well as their hydroxylated derivatives, extracted from mango peels, purified on polyamide and characterized by high-performance liquid chromatography/atmospheric pressure chemical ionization mass spectrometry for the first time. Xanthophylls esters, carotenes, and tocopherols have been identified and quantified in the fruit of seven Mexican mango cultivars by liquid chromatography-atmospheric pressure chemical ionization-time-of-flight mass spectrometry. A simple, precise, and rapid HPTLC method was established for quantitative determination of the bioactive marker compound mangiferin in the stem bark & leaves of mango.

USES:

Mango is one of the most popular of all tropical fruits. Mangiferin, being a polyphenolic antioxidant and a glucosyl xanthone, it has strong antioxidant, anti lipid peroxidation, immunomodulatory, cardiogenic, hypertensive, wound healing, antidegenerative and antidiabetic activities. Various parts of plant are used as a dentifrice, antiseptic, astringent, diaphoretic, stomachic, vermifuge, tonic, laxative and diuretic and to treat diarrhea, dysentery, anemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, leucorrhoea, hemorrhage and piles. All parts are used to treat abscesses, broken horn, rabid dog or jackal bite, tumor, snakebite, stings, datura poisoning, heat stroke, miscarriage, anthrax, blisters, wounds in the mouth, tympanitis, colic, diarrhea, glossitis, indigestion, bacillosis, bloody dysentery, liver disorders, excessive urination, tetanus and asthma. Ripe mango fruit is considered to be invigorating and freshening. The juice is restorative tonic and used in heat stroke. The seeds are used in asthma and as an astringent. Fumes from the burning leaves are inhaled for relief from

hiccups and affections of the throat. The bark is astringent, it is used in diphtheria and rheumatism, and it is believed to possess a tonic action on mucus membrane. The gum is used in dressings for cracked feet and for scabies. It is also considered anti-syphilitic. The kernels are converted into flour after soaking in water and eliminating the astringent principles.

SUMMARY:

Mangifera indica (MI), also known as Mango, aam, it has been an important tree in the Ayurvedic and indigenous medical systems for over 4000 years. Mangoes belong to genus *Mangifera* which consists of about 30 species of tropical fruiting trees in the flowering plant family Anacardiaceae. According to ayurveda, varied medicinal properties are attributed to different parts of mango tree. Mango possesses antidiabetic, anti-oxidant, anti-viral, cardioprotective, hypotensive, anti-inflammatory properties. Various effects like antibacterial, antifungal, anthelmintic, antiparasitic, antitumor, anti-HIV, antiresorption, antispasmodic, antipyretic, antidiarrhoeal, antiallergic, immunomodulation, hypolipidemic, antimicrobial, hepatoprotective, gastroprotective have also been studied. Pharmacologically and medicinally important chemical such as mangiferin, being a polyphenolic antioxidant.

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