

## A Review on Pharmacological Activities and Health Benefits of *Mangifera Indica*

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### ABSTRACT:

*Mangifera indica* L. belongs to the family of Anacardiaceae, commonly used herb in ayurvedic medicine. This review article is presented to compile all the updated information on its phytochemical and pharmacological activities, which were performed widely by different methods. The extracts from mango leaves (MLs) have been studied for their biological activities, including anti-inflammatory, antidiabetic, antioxidant, anti-allergic, anti-moebic, analgesic, anti-diarrheal and hepatoprotective properties have also been studied. These studies are very encouraging and indicate this herb should be studied more extensively to confirm these results and reveal other potential therapeutic effects.

**KEYWORDS:** *Mangifera indica*, Mangiferin, Anti-inflammatory, Analgesic, Antioxidant

and polyphenolic antioxidant. xanthone, which has potent anti-lipid peroxidation and antioxidant properties, wound healing, immunomodulation, cardiogenic, hypotensive, anti-diabetic and antidegenerative properties. (5) Different plant parts are used as antiseptics, dentifrices, vermifuge, stomachic, astringent, diaphoretic, tonic, and laxative and diuretic, as well as to treat asthma, anemia, diarrhea, and dysentery, rheumatism, insomnia, hypertension, coughing, bronchitis, toothache, piles, hemorrhage, and leucorrhea. Every component is utilized to treat tumors, rabid dog or jackal bites, broken horns, abscesses, heat stroke, miscarriage, datura poisoning, snakebite, stings, anthrax, blisters, oral wounds, tympanitis, diarrhea, colic, liver problems, bacillosis, bloody diarrhea, glossitis, indigestion, severe urination, asthma, and tetanus. (6)

### I. INTRODUCTION

Mango or aam, or *Mangifera indica* (MI), has been a significant herb in traditional medicine and Ayurveda. For more than 4,000 years. Mangos are members of the *Mangifera* genus, which contains roughly thirty different tropical fruit tree species. The Anacardiaceae is the name of the family of flowering plants. (1) The mango is indigenous to South Asia, where it spread throughout the world and became one of the most widely grown tropical fruits. The majority of mangos are grown in more than 85 countries worldwide, in tropical and subtropical regions free of frost. The sum approximately 3.69 million hectares are used for mango production

worldwide. (2) Thailand, China, and India are the top producers of mangoes. Bangladesh, Nigeria, Brazil, Mexico, the Philippines, Indonesia, and Pakistan. (3) Dietary antioxidants like ascorbic acid are abundant in mango fruit. Provitamins A and C, dietary fiber, carotenoids, and particularly phenolic compounds. (4) Mangiferin is a glucosyl

### II. COMMON NAME

*Mangifera indica* is commonly known by the following names:

Mabaz in Arab, Am (Um) in Bengali  
Mi wang in Chinese, Mango, Mangofrukt, and Mangotrae in Danish. Manga, Mangga, Manja, and Mangoestanboom in Dutch. Mango in English. Mango, Mangopuu in Finnish. Mangue, Manguier in French. Indischer Mangobaum, Mango in German. Magko, Mangko in Greek. Am, Ambi, Amia in Hindi. Mangoo, Mangou, and Anchar in Japanese. (7)

### TAXONOMICAL CLASSIFICATION

Kingdom: Plantae  
Subkingdom: Tracheobionta  
Superdivision: Spermatophyta  
Division: Magnoliophyta  
Class: Magnoliopsida  
Subclass: Rosidae  
Order: Sapindales  
Family: Anacardiaceae

Genus: *Mangifera*

Species: *M.indica*(8)

### GEOGRAPHICAL SOURCE

Originally, it came from tropical Asia, mostly in Myanmar and India (Bally, 2006).(9) In addition to its well-known fruits, the mango tree has many traditional medicinal uses. Mangoes are indigenous to South and Southeast Asia, and 55.4 million tonnes of mangoes (including guavas and mangosteens) were produced worldwide in 2018. India, China, Thailand, Indonesia, Pakistan, Mexico, Brazil, Bangladesh, Nigeria, and the Philippines are the top producers of mangoes.(10)Mangos are now grown all over the world in tropical and subtropical climates. There are numerous cultivars worldwide. More than 500 cultivars have been identified in Southeast Asia, which includes the Philippines, Malaysia, Indonesia, Singapore, and Thailand. *M. indica* is grown as a fruit with significant economic value in Thailand. Nam Dok Mai, Kiew Savoey, Okrong, Chok Anan, Fah Lan, and Gaew are some of the well-known and common *M. indica* cultivars in Thailand. (11)

### BOTANICAL DESCRIPTION

*Mangifera indica*, a large evergreen tree in the Anacardiaceae family, is dome-shaped, has dense foliage, and is usually heavy-branched from a robust trunk. It can reach a height of 10 to 45 meters.(12) The leaves vary in size and range in length from 15 to 45 cm. The length of a leaf petiole varies from 1 to 10 cm. *M. indica* leaves come in a variety of shapes, including oblong, oval, roundish-oblong, linear-oblong, ovate-lanceolate, and lanceolate. Some mango varieties have green, red, or yellow leaves, and the tops of the leaves are typically glossy. (13)The terminal inflorescence consists of long panicles that contain both male and female flowers. It is a pyramidal, branched, erect, and ostentatious flower cluster. Small, reddish-yellow flowers are produced. In the winter and spring, it blooms. Blossoms smell sweet. There is only one seed in the juicy, meaty fruit. Oval, kidney-shaped, ovoid-oblong, or nearly round fruits are all possible. The kidney-shaped seed is oval or flattened and pale yellowish-white. The fruit has a hairy cover that protects it. (14)



**Mangifera indica tree**



**Mangifera indica leaves**

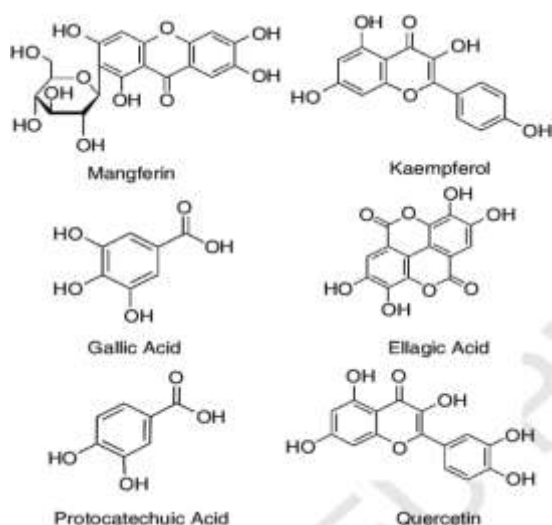
[Mango Tree]

### CHEMICAL CONSTITUENTS

A mango has 0.82% protein, 0.38% fat, 1.6% dietary fiber, and 15% carbs. Numerous minerals and vitamins, such as calcium, magnesium, potassium, sodium, zinc, cadmium, copper, and phosphorous, as well as several anthocyanidins, such as delphinidin, peonidin, and cyanidin, leucoanthocyanins, catechin, and gallic tannins, are found in mango leaves. Sesquiterpenes,

mangiferin,  $\delta$ -3-carene,  $\alpha$ -gurjunene,  $\beta$ -selinene, and  $\beta$ -caryophyllene are all found in mango leaf oil. It has been shown that mango leaves contain leucoanthocyanins, catechin, gallic tannins, mangiferin, and a few anthocyanidins, such as delphinidin, peonidin, and cyanidin. Essential oils can also be found in mango flowers and leaves. (15) The main bioactive components of mangiferin (xanthone glycoside) include isomangiferin,

tannins, and derivatives of gallic acid. According to reports, the bark contains tetracyclic triterpenoids, protocatechic acid, catechin, mangiferin, alanine, glycine,  $\gamma$ -aminobutyric acid, kinic acid, and shikimic acid. 3-ketodammar-24(E)-en-20S,26-diol, C-24, and cycloart-24-en-3 $\beta$ ,26-triol are the epimers of cycloart-25 en 3 $\beta$ ,24,27-triol and cycloartan-3 $\beta$ ,24,27-triol.(16)



### TRADITIONAL MEDICINAL USES

It has been explained that *Mangifera indica* is a useful herbal remedy for a number of illnesses.

**Aruchi/Anorexia:** Because of its Deepan (appetizer) quality and Amla (sour) flavor, eating unripe mangoes is a great way to manage anorexia.

**Heat stroke:** During the summer, people traditionally drink aam panna, a drink made from raw mangoes. When heat stroke strikes, it helps the body stay hydrated and cool down.

**IBS and Diarrhea:** Beejamajja swarasa is administered with Madhu in Atisara, and consuming powdered dried mango bark relieves diarrhea.

**Helps manage diabetes:** Rich in tannins and anthocyanins, tender mango leaves have a pink or purple hue. Consuming the juice of these mango leaves in the morning on an empty stomach aids in blood sugar regulation.

To aid in wound healing, apply two to five drops of mango seed oil. For accelerated wound healing, apply once or twice daily to the afflicted area. (17)

### PHARMACOLOGICAL ACTIONS

Numerous *in vitro* and *in vivo* investigations have been conducted to uncover *M. indica*'s diverse pharmacological potentials. Anticancer, anti-inflammatory, antidiabetic, antioxidant, antibacterial, antifungal, anthelmintic, gastroprotective, hepatoprotective, immunomodulatory, antiplasmodial, and antihyperlipemic effects have been shown for various parts of *M. indica* trees. (18)

#### Anti-inflammatory activity:

Wiechowski et al. looked into how the aqueous extract of *Mangifera indica* leaves exhibits strong anti-inflammatory effects. The activity was assessed using the cotton pellet granuloma method for chronic inflammation and the carrageen-induced rat paw edema method for acute inflammation. What causes *M. indica* to have an anti-inflammatory effect such as scavenging free radicals and increasing antioxidant molecules, which results in the generation of The primary mediator of acute inflammation's progression, cytokines, were stopped. (19)

#### Analgesic activity:

In 2015, Rajalakshmi et al. assessed the analgesic effects of the pyloric ligation model and Mice with acetic acid nociceptive pain stimuli and the hot plate method developed Algeria. The Mangiferin's ability to reduce pain was linked to its effectiveness at a dosage of 12.5–50 mg/kg. Giving a water extract made from *Mangifera indica* leaves orally (125–500 mg/kg) with an injection of vitamin C (1 mg/kg) every day for one week before administration of formalin could lessen discomfort. (20)

#### Anti-diabetic activity :

OT Adedosu et al. found that the alloxan-induced diabetic rats had a significant ( $P < 0.05$ ) rise in their fasting blood glucose levels. Significant results ( $P < 0.05$ ) were observed when the ethanol leaf extract of *M. indica* was administered to the diabetic rats reductions in fasting blood glucose levels when compared to diabetic rats that were not given treatment. According to research by MS Rajesh and J Rajasekhar, administering *Mangifera indica* methanolic and aqueous extract for 21 days was successful in lowering blood glucose levels and returning the diabetic rats' other biochemical parameters to normal. Normal rats in the extract's single dose study did not experience hypoglycemia. To identify the active principle or principles in the

extracts, more research must be done. Additionally, they verified that when compared to diabetic controls, oral administration of *Mangifera indica* seed kernel extracts decreased the levels of triglycerides and total cholesterol in diabetic rats. (21)

#### **Antioxidant activity :**

Antioxidants are compounds that trap free radicals to prevent or postpone oxidative damage, a molecule of interest. Numerous natural compound classes, such as polyphenols and phenolic Flavonoids and acids are said to be effective free radical scavengers. There have been reports of that a number of illnesses are brought on by reactive oxygen species (ROS) and other oxidants illnesses that affect people. Humans are equipped with antioxidant defenses against oxidants, including reactive oxygen species (ROS), by deactivating free radicals prior to They target parts of the human body. Antioxidants found in nature have significantly attracted attention lately due to their exceptional capacity to combat free radicals and oxygen species that are reactive. Given that practically every part of the mango tree is said to have Well-known antioxidants called polyphenols have been the subject of the majority of pharmacological research demonstrated that the antioxidant qualities of extracts from different parts of the *M. indica* tree are pertaining to the amount of polyphenols. (22)

#### **Antiallergic activity:**

Mangiferin's antiallergic effect was noted by Leiro et al. [28] in mice infected with *T. spiralis*, the nematode. Mangiferin treatment resulted in a notable decrease throughout the life cycle of the parasite, in serum levels of particular anti-*Trichinella* IgE. Lastly, mangiferin administered orally to rats prevented mast cell degranulation as assessed by the test for passive cutaneous anaphylaxis. Given that IgE is essential these findings indicated that mangiferin plays a role in the pathophysiology of allergic diseases could be helpful in the treatment of such illnesses. (23)

#### **Anthelmintic activity:**

Leiro et al. [28] examined the anthelmintic properties of mangiferin in mice that had been experimentally infected with the nematode *Trichinella spiralis*. The number of parasite larvae encysted in the musculature significantly decreased as a result of oral mangiferin administration throughout the parasite life cycle. (24)

#### **Antiamoebic activity:**

Research on plant extracts with antiamoebic properties was conducted by Cimanga Mangiferin, an extract from the stem bark of *M. indica*, was shown to have antiamoebic properties in vitro by et al. [33]. Metronidazole served as the reference medication. The findings offered logical proof in favor of the traditional amoebiasis treatment method of using mangiferin. (25)

#### **Hepatoprotective Properties:**

Fatty liver disease (FLD), also known as hepatosteatosis, is primarily brought on by an imbalance in fat synthesis and metabolism within the body. Increased fat intake also has detrimental impacts the liver's fatty acid oxidation and increased deposition in the primary functional Hepatocytes, or liver cells, are the source of oxidative stress and hepatic steatosis. The signaling pathways are changed by extremely high fat cell deposition. The inflammatory process associated with obesity involves the nuclear factor kappa B (NF- $\kappa$ B) and peroxisome proliferator-activated receptor (PPAR) pathways. Subclinical icteric hepatitis can develop into cirrhosis, carcinoma, and necro-inflammatory hepatitis as liver damage worsens. As a result, substances that function as antioxidants, lipid peroxidation inhibitors, and free radical scavengers may exhibit hepatoprotective qualities. (26)

#### **Anti-Diarrheal Activity:**

One of the most contagious illnesses is diarrhea, which is brought on by consuming unsafe water, inadequate hygienic conditions, raw meat, and dietary intolerances, which accounts for 3.2% of deaths worldwide. The primary organisms in charge of This illness involves microbial communities such as *Vibrio*, *Candida albicans*, and *Escherichia coli*. *Salmonella typhi*, *Staphylococcus aureus*, *Shigella flexneri*, and *cholerae*. The effects of an aqueous extract of mango young leaves on Gram-negative bacteria that cause gastrointestinal disorders were documented by De et al. [85]. According to the authors, the crude extract's phytochemicals are an essential anti-diarrheal agent. At dose levels of 300, 200, 100, and 50 mg/mL, the MLs aqueous extract was tested against a variety of pathogens, including *Vibrio cholera*, *S. typhi*, *E. coli*, and *S. sonnei*. It was found that as the dosage level rose, so did the anti-diarrheal activity. Therefore, it was determined that the mango plant's aqueous young leaf extract could be used to treat diarrhea. (27)

### III. CONCLUSION

The extensive survey of literature revealed that *Mangifera indica* is an important source of many pharmacologically and medicinally important chemicals such as mangiferin, mangiferonic acid, hydroxymangiferin, polyphenols and carotenes, flavonoids, benzophenones, sesquiterpenes, saponins, xanthenes, tannins, terpenoids, and alkaloids. Mango leaf extract is found useful for the treatment of common diseases like diarrhea, chronic ailments like diabetes, and fatty liver disease anti-inflammatory, analgesic, antipyretic, antioxidant, immunomodulator, antitumor, antiviral, anthelmintic, antiallergic, antihistaminic, cardioprotective, anticholinergic, antiamebic and antidiabetic effects. Though, considerable research has been and are being done on mangiferin and its plant source. Yet, the potential therapeutic effects of mangiferin have not been fully exploited till now. There is an ample scope for researchers to work further in this area.

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