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Review Article

MANGIFERA INDICA (*AMRA*) AND ITS SEED KERNEL - AN USEFUL DRUG

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ABSTRACT

Mangifera indica (*Amra*), family Anacardiaceae, a large plant found wild or semi- wild nearly throughout India in tropical and sub-tropical hilly forests. Commonly it is cultivated throughout the country for its fruits and is widely used in folk and Ayurvedic system of medicine. Various parts of plant contain mangiferine, amino acid, gallotannin, gallic acid, m-digallic acid, ethylgallate, isoquercetinquercetin and β – sitosterol, fat, calcium, protein and tannic acid. Therapeutic indications of *Mangifera indica* mentioned in Ayuvedic classical texts are *Vaman* (vomiting), *Atisar* (diarrhea), *Hridadaha* (heart burn), *Raktasrava*, *Bhagnasandhana*, *Yoni roga* etc, whereas from modern point of view it has Antibacterial, Anti-fungal, Antiviral, Antioxidant, Antipyretic and Antiamoebic properties. In this review efforts are made to discuss various aspects of *Amra*, which will certainly help the researchers to a great extent in their field.

KEYWORDS: Ayurveda, *Amra*, *Mangifera indica,* Seed kernel.

INTRODUCTION

Mangifera indica is a large spreading evergreen tree used in Ayurvedic system of medicine to cure various ailments and is one of the active ingredient in numerous herbal and polyherbal formulations. The ripe fruit has laxative property, whereas the bark and seed kernel are used in hemorrhage, diarrhea and other bodily discharge. The root, bark, stem, and leaf are prescribed in combination with other drugs to treat snake bite.[1] Similarly many more information are available in Ayurvedic classical text books related to *Amra*. Beside all these *Amra hasan* unique place in world by its nutritional value.

Historical review[2]

In *Jaiminibrahamana* (2/156) *Amra* is described with *Badar*. We also get references of *Amra* in *Brihadaranyaka Upanisad*. (4/3/36) In *Shankha yana grihasutra* (1/11/2) it is said to be *Phalottama*. In other *Griha sutra* its *Pallava* and Samitha are describe. In *Shankhalikhita dharma sutra* (220) *Amra* is counted as *Shraddadeyaphala* with *Draksha* etc. In *Yagyavalkyashiksha* (33) it is describe as *Dantadhavana*.

Classical categorization/*Gana*

Amradi varga[3, 4, 5, 6]
Ausadhi varga[7]
Phala varga[8, 9, 10]
Bhallatakadi varga[11]
Mahavrikshavarga
Nyagrodhadigana[12](145), 13(107)
Phala varga[12] (148)
Amlavarga (*Amlagana*) 13(84)

Table 1: Showing synonyms of *Amra*

Dhanvantari Nighantu[3]	*Chuta, Rasala, Kiresta, Madirasakha, Kamanga, Sahakara, Parpusta, Madodbhava*
Kaiyadeva Nighantu[7]	*Chuta, Rasala, Sahakara, Chaitravriksha, Vanapuspotsava, Manmatha, Shyamatailaka, Shilishta, Supathamoda, Pikamahotasava, Manoratha, Maddhasaha, Maakanda, Shourdikipriya, Samanvitakaari, Pindiphala, Atisaurabha, Kokilabandhu, Shista, Amra*
Raja Nighantu[4]	*Chuta, Rasala, Kiresta, Kamanga, Sahakara, Kaamashara, Madhuli, Kaamavallabha, Bhringabhista, Sidhurasa, Sumadana, Kokilotsava, Vasantaduta, Amlaphala, Madadhaya, Manmathalaya, Madhvavasa, Madhavadhruma, Pikaraga, Nripapriya, Priyambu, Kokilavasa, Amra*
Saligram Nighantu[8]	*Rasala, Kamanga, Sahakara, Amra, Maakanda, Atisaurabha, Madhuduta, Pikavallabha*
Madanpal Nighantu[9]	*Chuta, Rasala, Sahakara, Amra, Maakanda, Atisaurabha*
Adarsa Nighantu [11]	*Chuta, Rasala, Sahakara, Amra*
Priya Nighantu[10]	*Rasala, Sahakara*
Saraswati Nighantu [14]	*Chuta, Rasala, Sahakara, Amra, Manmatha, Maakanda, Pindiphala, Atisaurabha*
Sodhala Nighantu[5]	*Chuta, Rasala, Kiresta, Madirasakha, Kamanga, Sahakara, Parpusta, Madodbhava, Amra*

Vernacular names

Name of the Region- Regional Names

Arabic - *Ambaja*[4, 8, 11, 15]

Assamese - *Am, Ghariam*[24]

Bengali-*Ama*[4, 8, 15]

English-*Mango*[4,8], Spring tree, Cupid's favourite, Cuckoo'sjoy[24]

Gujarati -*Ambo*[4, 8, 11, 15]

Hindi-*Ama*[4, 7, 8, 11, 15]

Kannada- *Mavinaphala (Elayamavinakavi*) [24]

Malayalam - *Amram, Cutam, Gomanne, Manna, Nattumavu, Tenmavu.*[24]

Marathi-*Amba*[4, 11, 15], *Aahba*[8]

Oriya -*Ambo*, *Amo, Boulo, Chuto*[32]

Punjabi -*Amba*[15]

Pharsi - *Aamba*[7, 8, 11]*Amba*[15], *Amba, Naghzak*[24]

Santhal - *Ul*[24]

Tamil - *Manga, Marama, Mamarama*[15]

Telugu - *Amramu, Elamavi, Gujjumamidi, Makandamu, Mamidi, Mavi Mavidi, Rasamamidi, Satamu*[24]

Sing - *Makandamu, Etamba, Amba*[24]

Sind -*Amb, Amu*[24]

Urdu - *Amba*[24]

Taxonomy[16]

Kingdom: *Plantae plants*

Subkingdom: *Viridaeplantae* **–** green plants

Division: *Angiospermae*

Subdivision: *Spermatophyta* (Seed plant)

Class: M*agnoliopsida*

Subclass: Rosidae

Order: Sapindales

Family: Anacardiaceae

Genus: *Mangifera*

Species: M. Indica L

English name: *Mango*

Botanical description[24]

Tree - A large, evergreen tree, 10-45m high.

Leaf - Leaves are simple, linear, oblong or elliptic-lanceolate. 10-30 cm long.

Flower - Flowers are small, reddish white or yellowish green, in large panicles.

Fruit - fruit are variable in form and size, green, yellowish or red fleshy.

Seed - Seeds are solitary, ovoid- oblique, encased in a hard fibrous endocarp

Flowering: November to February (Basantritu)

Fruiting time: Mango takes about five months from the time of flowering to mature and ripen.

Origin and distribution[24]

It occurs wild or semi- wild nearly throughout India in tropical and sub-tropical hilly forests, particularly near, nullahs and ravines. It is common in sub-tropical Himalayas, Chota Nagpur, Bihar, Orissa, West Bengal, Assam, hill forests of Eastern and Western Ghats, Deccan and Andaman Islands. Commonly it is cultivated throughout the country for its fruits.

Useful parts[24]**:** Root, Bark, Leaf, Flower, Fruit, Seed kernel.

Pharmacological characters[24]

Bark Unripe fruit Ripe fruit Seed kernel[23]

Rasa: *Kashaya Amla Madhura Kashaya, Madhura*

Guna: *Laghu, Ruksha Laghu, RukshaGuru, Snighda*

Veerya: *Sheeta Sheeta Sheeta*

Vipaka: *Katu Amla Madhura*

Doshaghnata*- Kaphapittashamaka* (Bark, leaf, flower, seed kernel).

Vatapittashamaka (Ripe fruit)

Tridoshakaraka (Unripe fruit)

Chemical constituents: Fat[11], calcium[11], protein[11] and tannic acid.[15]

Part wise distribution

Common in various parts[24]: Mangiferine, Amino acid, Gallotannin, Gallic acid, m-digallic acid, Ethylgallate, IsoquercetinQuercetin and β – sitosterol

Fruit: Epicatechin, β carotene, α- xanthophyll, Citric acid, Ellagic acid, Malic acid, m-trigallic acids, Riboflavin, Vitamin, Glucose

Flower: Aliphatic and aromatic esters of gallic acids, D – arabinose, Glucose, Galactose

Pericarp oil: Isoamyl alcohol, α –and β –pinenesmyrcene, Limonene and Fenchone

Seed oil: Methyl alcohol, Propyl alcohol, Isopropyl alchol, Butyl alcohol, Isoamyl alcohol.

Leaves: Citronellal, Diterpene, Gerananiol, Limonene, Mangiterol, Mangiferone, Nerol, Nerylacetate, α and β pinene, Tannin, Chinomin, Methylchinomin, Isochinomin, Hyperin, Friedelin, LupeolTaraxerol, Taraxerone, Leucine, Tyrosine, Valine

Stem bark: Butin, Fisetin

Root bark: α and β amyrins, Cycloartinol, Friedelan-3β-ol, Mangiferonic acid

Resin: Mangiferolic acid, Hydroxymangiferonic acids, Erythrodiol, Oleanolic aldehyde

Pharmacology activity[24]

Anti-bacterial, Anti-fungal, Anti-viral, Antioxidant, Antipyretic, Antiamoebic, Coagulase Antiplasmodial, Hypoglycaemic, Diuretic

Toxicology[24]

The LD_{50} of mangiferine in albino rats was 365 mg/kg *i.p.*

The LD_{50} of 50% ethanolic extracted of the whole plant (excluding root) is reported to be more than 1000 mg/kg *i.p.*in mice.

Therapeutic uses

1. *Beejamajjachurnanasya* is given in nasasrava[13(chi 303)]
2. *Amrabeejamajja kwatha virechana* is given in *Chhardi*.[13(chi 327)]
3. *Beejamajja swarasa* is given with *Madhu* in *Atisara*.[17]
4. *Amraasthi rasa* is used in Bleeding from nose and *Krimiroga.*[11]
5. *Vrana*[13(107), 18(16/36)]

a. *Sangrahani*[7, 13(107), 18(16/36), 19]
6. *Stambhana*[11. 15.]
7. *Mutrasangrahaniya*[15, 19.]
8. *Pustikar*[17(6/36)]
9. *Rakta shodhaka*[15]
10. *Purishasanghanraniya*[19]
11. *Hridya*[12(199), 18(7/188), 19]
12. *Bhagnasandhana* [13(107), 18(16/36)]
13. *Medapiitaraktasrava*[13(107), 18(16/36)]
14. *Trishna*[13(107).]
15. *Daha*[13(107), 18(16/36)]
16. *Yoni roganashaka*[13(107), 18(16/36)]
17. *Chhardi*[13(327)]
18. In *Mukhapaka- Lepa* of *Amrabeejamajja, Lohachurna, Rasouta, Gairika*, with *Madhu* should be applied over the face. [17(19/108)]
19. In *Charmadalakhustha – Lepa* of *Amrabeejamajja* and *Saindhavalavana* should be prepared in *Kamsya* patra.[17 (25/113)]
20. In *Vamana - Amrabeejamajja* and *Bilvaphala majjakashaya* is use with *Madhu* and *Sita*.[17 (54/68)]

Table 02: Showing formulations containing *Amrabeejamajja*

Caraka samhita[19]	*Pushyanuga churna(1026), Jambavadi churna(363), Pittajaatisaranashaka yoga,(683) Mahanilataila(916), Sarvatisarnashakaghrita,(1266) Khaphajaatisaranashaka yoga(691) Twaksavarnikaranalepa,(861)13(1025) Dhatakyaditaila*
Susrutasamhita[12]	*Kubajkadyanjana,Ut(59) Gutikanjana,Ut(83) Shaivaladitaila Ut(101)*
AstangaHridya[13]	*Pushyanugachurna,Ut (34/45),Dhatakyadi taila15Ut (34/51)*
Sarangdhara[20]	*Vrihadagangadharachurna, (MK-6/53-55) Jatiphaladichurna(MK6/72) Palitalepa(MK 11/72-76), Amrabeejadilepa(MK11/10)*
Cakradatta[21]	*Pushyanugachurna(61/13) Bilvamrasthikashaya(3/44) Amrabeejamajjaswarasa(9/36), Hritakyadyagan raga(36/36) Savarnakarkaliyakadilepa(44/99) Dhatyamrajjalepa(55/95) Amrasthilajasinthutthaleha(64/28)*
Vangasena[17]	*Pushyanugachurna(18/51),Nilabindutaila(32/162), Kaitakyadyataila(32/173) Mayurpittadyataila(32/177), Chandanadichurna(45/93)*
Gada nigraha[22]	*Pushyanugachurna(3/193) Gangadharachurna(3/266)*

Ut – Uttarsthan; MK- Madhyamakhanda

Traditional medicinal uses[25]

Mango tree is considered sacred both by the Hindus and Buddhists. Lord Buddha was once presented with a grove of mango trees under which he used to rest and since then the Buddhist considers the tree holy. According to a Burmese legend, a gardener presented Buddha with a large mango fruit. Buddha handed the stone of the fruit to Ananda to plant in a suitable place. When Ananda planted the stone as directed, Buddha washed his hands over it and suddenly a beautiful white mango tree sprang from it, bearing flowers and fruits. This story is represented in a sculpture at Bharhut. Hindus consider the tree of great religious significance. Symbolically it is Prajapati, Lord of the Creation. Therefore, on all religious occasions, Hindus use its twigs as tooth brushes and its leaves as spoons for pouring libations. A long iron nail is hammered through a mango into the foundations of a building to save it from harm.

The origin of the tree is mentioned in the mythology. The daughter of Surya, the Sun-god, was being pursued by an enchantress. To escape her, the girl threw herself into a pond and turned into a lotus flower. A king saw the flower and wished to possess it. But before he could take possession of it, the enchantress brunt it, and from the ash of lotus flower arose a mango tree. The king saw the tree full of mango fruit, and desired it. When the fruit ripened, from it arose the daughter of Surya whom the king recognized as having been his wife in an earlier birth. In aboriginal India, the bride and the bridegroom have to circumambulate a tree before the marriage ceremony is performed. According to an Oriyan tale, the tree was created by kittung from the thigh bone left behind accidentally by the worshipper. The tree is also associated with Kinchesum, a god accepting human sacrifice. It is a favorite tree for committing suicide by hanging. The Gadaba and Kond tribes associate mango fruit with human testicles as they find a resemblance between the two.

Research Studies

1. Multiple antibacterial and phytochemical analysis of mango kernel extracts on aquatic and animal pathogens; The antibacterial activities of hexane, ethyl acetate, acetone, ethanolic, methanolic and aqueous extracts of *Mangifera indica* kernel were studied in vitro against aquatic pathogens viz. Aeromonashydrophila (six strains), Pseudomonas putida (three strains), P. aeruginosa (three strains), P. fluorescens (two strains), Flavobacterium column are (three strains), Vibrio parahaemolyticus (two strains), V. alginolyticus (two strains), V. fluvialis, V. harveyi, Edwardsiellatarda (two strains) and animal pathogen, Escherichia coli (five strains). The ethanolic extract showed higher antibacterial activities against almost all tested microorganisms with minimum inhibitory concentration (MIC) ranged from 200-300Î¼g. (Int J Pharm Bio Sci 2013 Apr; 4(2): (P) 809 – 818).
2. Phytochemical screening of ethanolic extracts of stem, Leaves, flower and seed kernel of *Mangifera indica* L. Leaves of *Mangifera indica* revealed the presence of alkaloids, carbohydrates, phytosterols, tannins, fixed oils and fats, resins, phenols, flavonoids, proteins; Stem of *Mangifera indica* showed the presence of alkaloids, carbohydrates, phytosterols, resins, phenols, tannins, flavonoids, proteins; Whereas the flower and seed kernel revealed the presence of alkaloids,

carbohydrates, saponins, phytosterols, fixed oils and fats, resins, phenols, tannins, flavonoids, proteins and amino acids. (Int J Pharm Bio Sci 2013 Apr; 4(2): (P) 383 – 389).

3. Preliminary investigation on the antibacterial activity of mango. (*Mangifera indica* L: Anacardiaceae) seed kernel. Qualitative phytochemical analysis indicated the presence of important phytochemical compounds such as glycosides, saponins, flavanoids, tannins and alkaloids. There was no significant difference in the phytochemical content between the single and assorted mango seed kernels. However, the free radical scavenging study indicated that the assorted mango kernels showed slightly higher activity than the single species (P<0.05). The crude methanolic extract of mango seed kernel at a concentration of 100 mg/mL is found to have potential antimicrobial activity against MRSA and E. coli compared to V. vulnificus. Study on the antibacterial activity also indicated that there was no significant difference in the antibacterial activity of the single and assorted mango seed kernel extracts (Asian Pacific Journal of Tropical Medicine (2010)707-710).
4. Screening of antibacterial tannin compound from mango (*Mangifera indica*) seed kernel extract against Methicillin resistant Staphylococcus aureus (MRSA). The mango seed kernel ethnolicextrac (MKE) was separated by reverse phase HPLC with acetonitrile linear gradient and also identified by Nuclear Magnetic Resonance (NMR), Mass Spectroscopy (MS) and Infrared (IR) for structural characterization of antimicrobial tannin compounds. It showed significant activity against Methicillin Resistant Staphylococcus aureus (MRSA) at the MIC of 0.03mg/ml. These results indicated that the active component of the MKE was a type of complex Tannin. (Elixir International Journal, 40C (2011) 5251-5255.
5. Effects of Processing Techniques on the Nutritional and Anti-nutritional Contents of Mango (*Mangifera indica*) Seed Kernel. The results of chemical analysis showed no adverse effect of soaking, boiling, HCl treatment and Ca(OH)2 treatment on the crude protein, ether extract and nitrogen free extract. Treatment of soaked and boiled Mango Seed Kernel with Ca(OH)2 was found to effectively enhance the reduction of anti-nutritional factors to barest minimum, if not complete removal. (World J Young Researchers 2012;2(3):55).
6. Ethnopharmacology of *Mangifera indica* L. Bark and Pharmacological Studies of its Main C-Glucosylxanthone, Mangiferin. Many different pharmacological activities, antioxidant, radio protective, immunomodulatory, anti-allergic, anti-inflammatory, antitumor, antidiabetic, lipolytic, antiboneresorption, monoamine oxidase-inhibiting, antimicrobial and antiparasitic, have been reported for mangiferin. All these studies indicate that a wide part of activities acknowledged to preparation based on *Mangifera indica* bark could be attributed to this C-glucosyl-xanthone. (International Journal of Biomedical and Pharmaceutical Sciences ©2007 Global Science Books).
7. Antimicrobial Evaluation of Mangiferin Analogues.The naturally occurring xanthone glycoside mangiferin has been isolated by column chromatography from the ethanol extract of stem bark of *Mangifera indica.* Mangiferin was further converted to 5-(N-phenylaminomethyleno) mangiferin, 5-(N-p-chlorophenylaminomethyleno) mangiferin, 5-(N-2-methylphenylaminomethyleno) mangiferin, 5-(N-p-methoxyphenylaminomethyleno) mangiferin, 5-(N,N-diphenylaminomethyleno) mangiferin, 5-(N--napthylaminomethyleno) mangiferin and 5-(N-4-methylphenylaminomethyleno) mangiferin. All the analogues exhibited moderate to mild activity against Staphylococcus aureus, Escherichia coli, Candida albicans, Aspergillusniger. One of the mangiferin analogues namely MPAMM was found to be more effective than other compounds against Gram-negative organism, Escherichia coli. In the antifungal activity study, mangiferin and NAMM were found to be more effective than other compounds against Candida albicans. Good activity against Aspergillusniger was shown by 5-(N-4-methylphenylaminomethyleno) mangiferin. (Indian J Pharm Sci. 2009 May-Jun; 71(3): 328–331).
8. Anti-enteric bacterial activity and phytochemical analysis of the seed kernel extract of *Mangifera indica* Linnaeus against Shigelladysenteriae (Shiga, corrig.) Castellani and Chalmers. Phytochemical scrutiny of M. indica indicated the presence of phytochemical constituents such as alkaloids, gums, flavanoids, phenols, saponins, steroids, tannins and xanthoproteins. Antibacterial activity was observed in two crude extracts and various fractions viz. hexane, benzene, chloroform, methanol and water. MIC of methanol fraction was found to be (95±11.8) µg/mL. MIC of other fractions ranged from 130-380 µg/mL. (Asian Pacific Journal of Tropical Medicine, Volume 4, Issue 4, Apr 2011; 294-300).
9. Characterization of Anti-microbial Compounds Isolated from *Mangifera indica* L seed kernel.The methanol extract of *Mangifera indica* seeds, which contained coumarins, terpenes, tannins and flavonoids showed high antibacterial activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, and antifungal activity against Candida albicans. Four phenolics and flavonoid compounds were isolated and identified by ^{1}H NMR and LC-MS. (University of Africa Journal of Sciences; Vol.2, 77-91).
10. *Mangifera indica* (Mango); Pharmacogn Rev. Mango possesses antidiabetic, anti-oxidant, anti-viral, cardiotonic, hypotensive, anti-inflammatory properties. Various effects like antibacterial, anti-fungal, anthelmintic, anti-parasitic, anti-tumor, anti HIV, antiboneresorption, antispasmodic, antipyretic, antidiarrhoeal, antiallergic, immunomodulation, hypolipidemic, anti-microbial, hepatoprotective, gastroprotective have also been studied and mangiferin pharmacological chemical has strong antioxidant, anti-lipid peroxidation, immunomodulation, cardio tonic, hypotensive, wound healing, antidegenerative and antidiabetic activities.(2010 Jan-Jun; 4(7): 42–48).

11. Anti-allergic properties of *Mangifera indica* L. extract (Vimang) and contribution of its glucosylxanthone-mangiferin; In this study, the effects of Vimang and mangiferin, a C-glucosylxanthone isolated from the extract, on different parameters of allergic response are reported. Vimang and mangiferin showed a significant dose-dependent inhibition of IgE production in mice and anaphylaxis reaction in rats, histamine-induced vascular permeability and the histamine release induced by compound 48/80 from rat mast cells, and of lymphocyte proliferative response as evidence of the reduction of the amount of B and T lymphocytes able to contribute to allergic response. In these experiments, ketotifen, promethazine and disodium cromoglicate were used as reference drugs. (Journal of Pharmacy and Pharmacology, Volume 58, Issue 3, pages 385–392, March 2006)
12. In vitro antimicrobial activity and the major polyphenol in leaf extract of *Mangifera indica* L; Results showed that leaf extracts of M. indica. L possesses mild antimicrobial activity against S. typhi, E. coli, S. aureus, and B. cereus but surprisingly managed to hold the bacterial growth below the initial number for the 360 min test time as compared to the negative controls thus exhibiting that the extracts act as bacteriostatic agents (Malaysian Journal of Microbiology, 2009,Volume 11, Issue 4).
13. Utilization of Mango seed; The major components of mango seed are starch, fat and protein. The oil of mango seed kernel consist of about 44–48% saturated fatty acids (majority stearic) and 52–56% unsaturated. Mango seed kernels have a low content of protein but they contain the most of the essential amino acids, with highest values of leucine, valine and lysine. Mango seed kernels were shown to be a good source of polyphenols, phytosterols as campesterol, sitosterol and tocopherols. In addition, mango seed kernel could be used as a potential source for functional food ingredients, antimicrobial compounds and cosmetic due to its high quality of fat and protein as well as high levels of natural antioxidants. (International Food Research Journal 19(4): 1325-1335, 2012)
14. Mango (*Mangifera indica*) kernel: chromatographic Analysis of the Tannin, and stability study of the associated polyphenol oxidase activity; Results showed that a 6.4% (w/v) gravimetric yield of tannin from dry mango kernel meal contained tannic acid, gallic acid, and epicatechin in the ratio 17:10:1, respectively. Acid hydrolysis of the condensed tannins indicated the presence of ellagic acid, gallocatechin, and an acylatedcyanidin in the ratio 11:7:5. Moist heat at 90°C inactivated PPO by 50% of its maximum activity within 3 min. Furthermore, up to 90% inactivation could be achieved after 5 min of water blanching, thereby reducing significantly the rate of undesired browning leading to tannin formation. Water-blanching would advantageously leach soluble tannic substances into the soak-water. (Journal of food composition and analysis, July 24, 1999).
15. Some activities of peroxidase from Mango (*Mangifera indica* L. Var. Mapulehu) kernel; international journal of biological chemistry,5:2011: 200-206)
16. Antibacterial activity of mango kernel extracts; The results showed that the minimum inhibition concentration of extracts that inhibited the growth of Escherichia coli and Bacillus subtilis was after 10X dilution (1 mM). The results obtained confirmed the antibacterial potential of mango kernels extracts and this would probably become an alternative source of new and natural antibacterial agents. (Journal of applied science; 2009; 9; 3013-3019).
17. Development and evaluation of herbal gel formulation of *Mangifera indica* linn extract: The gel prepared using *Mangifera indica* L. bark hydroalcoholic extract was found good gel characteristics with respect to homogeneity, spredability, stability and anti-inflammatory effect was comparable and can be of commercial significance. (ijrps; 4(2), 260-265).
18. Isolation of phenolic esters from the seed kernel of *Mangifera indica* and their biological studies: In this study, Methyl gallate, gallic acid and 1,2,3,4,6- penta- O-galloly-β-D-glucose were isolated from the seed kernel of *Mangifera indica*, their structures were elucidated on the basis of extensive spectroscopic analysis and compared with known compound ursolic acid. Isolated compound were examined for in-vitro elastase inhibition activity which showed an excellent activity and it also showed good synergy with different combination. It was concluded that the mango seed kernel extract or its isolated compound can be used for skin care application either singly or in combinations with other material. (JNPPR, 2012, 2(3): 436-439).
19. Development of Amrabejaadi antidandruff cream - an Ayurvedic formulation; Classical Ayurvedic formulations can be modified in new formulation with increased acceptability by increasing Shelf life and stability and also as per satisfaction of Physician, Pharmacist and consumer. (Ganeriwala et al., IJPSR, 2015; Vol. 6(6): 2601-2609.)

CONCLUSION

Mangifera indica is a common plant having great importance in nutritional, social, religious and medicinal field, which is evident from different classical texts and literatures. The fruit bears the nutritional as well as therapeutic property in both ripe and unripe state. The bark, flower and seed kernel also cures number of diseases like vomiting, anemia and dandruff respectively. The leaves bear social and religious values and even it cure piles. It's wide spread therapeutic indications require more intensive studies and research works.

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