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Aamra Phala (Mangifera indica L.) as Mahabhaishajya - A Comprehensive Review

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Abstract:

Aamra (Mangifera indica L.) commonly known as “King of Fruits”. Aamra has commercial importance in India. The Aamra fruit has three main parts: Phala Magaj (pulp), Phala twak (peel), and Aamra beejmajja (kernel). The pulp is the most-consumed part, while the peel and kernel are usually discarded though they have nutritional and medicinal significance.Mahabhaishajya is an Ayurvedic term that refers to Aahara (food), as the superior medicine. This review article is presented to study Aamra as a Mahabhaishajya, a complete food (Aahariya Dravya) with significant medicinal property, by compiling all the information on phytochemical and pharmacological activities of three different parts and at the both ripe and unripe stage of Aamra according to literature review and published research.

Key words: Mangifera indica L., mangiferin, pharmacological properties, Pakwa Aamra, Apakwa Aamra

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INTRODUCTION:

Aamra (Mangifera indica L.), known as Aamra in Sanskrit is the **king of fruits** which has a delicious taste and fragrance with high nutritional value. It belongs under the Anacardiaceae family. Major parts of Aamra fruit are Peel, Pulp and Seed. According to Ayurveda, Aamra as a whole fruit is having nutritive and medicinal properties. India is the leading Aamra producer in the world, producing an estimated 24.7 million tons of Aamras annually. This number accounts for almost half of the entire global Aamra production. Although the Aamras are grown and harvested in India, very few of the Aamras are distributed in the worldwide market. Less than 1% of the total Aamras grown are released for international trade or sale. India is the leading consumer of Aamras worldwide and consumes most of the Aamras produces[1]. The production of Aamra continues to rank it as the predominant tropical fruit in the 21st century.

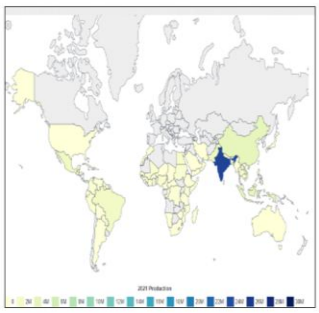


Fig -1. Production share (%) of the top ten Aamra-producing countries in 2019–2020.

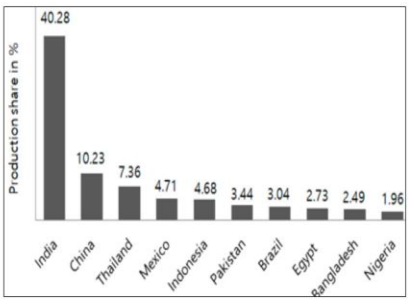


Fig -2. Production share (%) of the top ten Aamra-producing countries in 2019–2020

Country	2021 Production
India	25M
China	3.8M
Indonesia	3.6M
Pakistan	2.7M
Mexico	2.4M
Brazil	2.1M
Malawi	1.7M
Thailand	1.6M
Bangladesh	1.5M
Vietnam	1.4M

Fig -3. Aamra Production by Country 2021

Aim and Objectives:

AIM-To corelate pharmacological properties and therapeutic uses of Aamra Phala with ancient and modern available literature.

OBJECTIVE-

1) To compile Pharmacological properties of Aamra at both ripe and unripe stage according to Ayurvedic Literature and Research Studies.
2) To compile Therapeutic uses of Aamra at both ripe and unripe stage according to Ayurvedic Literature and Research Studies.
3) To review the phytochemical composition at the both ripe and unripe stage
4) To corelate Pharmacological Action of Different parts of Aamra according to Ayurvedic Samhitas and previous research Studies

MATERIALS AND METHODOLOGY-

1) Literature, published journals and Research work related with Aamra were reviewed
2) Physicochemical properties of Aamra were correlated
3) Observations from above data were noted and inferences related to aim of the study were concluded

CONCEPTUAL STUDY REVIEW-

1) The common names of Aamra (Mangifera indica L.) include:

Maximum 63 names are mentioned in Sanskrit Language which is mentioned Ayurvedic Granthas[2]

- Arab: Mabaz
- Bengali: Am (Um)
- Chinese: Mi wang
- Danish: Aamra, Aamrafrugt, Aamratrae
- Dutch:Manga, Mangga, Manja, Aamraestanboom
- English: Aamra
- Finnish: Aamra, Aamrapuu
- French: Mangue, Manguier
- German: Indischer Aamrabaum, Aamra
- Greek: Magko, Mangko
- Gujrathi: Aambo
- Hindi: Aam, Ambi, Amia
- Japanese: Anchaa, Aamrao, Aamrau
- Marathi-Aamba
- Persian: Amb
- Sanskrit: Aamra, Ambrah, Rasal, Sahakaar, Atisaurabh, Kaamang, Madhudut, Makand, Pikvallabh
- Sinhalese: Amba
- Tamil: Mangas, Mau, Mampalam etc

2) Taxonomical Classification[3]:

- Kingdom: Plantae
- Subkingdom: Tracheobionta
- Superdivision: Spermatophyta
- Division: Magnoliophyta
- Class: Magnoliopsida
- Subclass: Rosidae
- Order: Sapindales
- Family: Anacardiaceae
- Genus: Mangifera
- Species: M. indica

3) Species Of Aamra[3]:

Mangifera caesia
Mangifera casturi
Mangifera foetida
Mangifera griffithii
Mangifera kemanga
Mangifera longipes
Mangifera mekongensis
Mangifera altissima

Mangifera camptosperma
Mangifera decandra
Mangifera indica
Mangifera laurina
Mangifera macrocarpa
Mangifera odorata
Mangifera quadrifida
Mangifera persiciformis

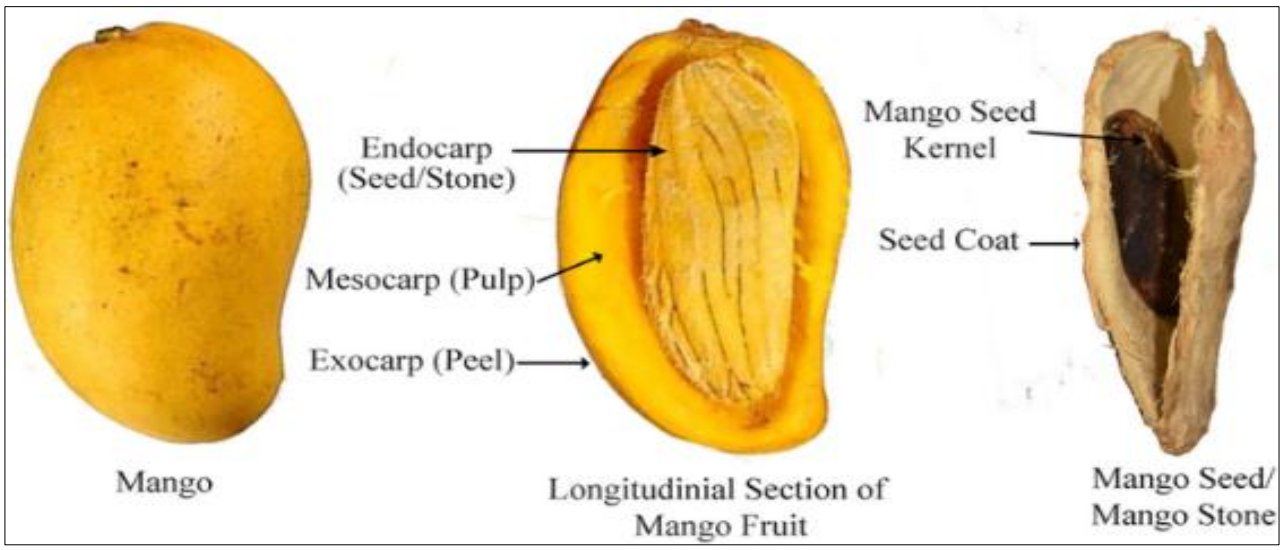
Mangifera persiciformis
Mangifera camptosperma
Mangifera decandra
Mangifera indica
Mangifera laurina
Mangifera macrocarpa
Mangifera odorata
Mangifera quadrifida

4) Botanical Description[4] -

A large, evergreen tree, Hight- 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 (Vasant ritu)
Fruiting time: Aamra takes about five months from the time of flowering to mature and ripen.

Fig 4- a) Mango tree b) Mango Flower and Fruit

1) <u>Parts of Fruit –</u> There are main 3 parts of fruit ie. Aamra phala twak/ Peel (Epicarp), aamra gara/Juice/ pulp (mesocarp), Aamra beejmajja/ Seed Karnel (endocarp)



2) <u>Aamra Phala Description:</u>

According to Ayurveda Both unripe (Apakwa Aamra) and ripe (Pakwa Aamra) fruits have different properties (Gunakarma) and different medicinal use (Rogaghnata). According to previous research study Aamra at both unripe stage (Apakwa Aamra) and ripe (Pakwa Aamra) showed different medicinal action and different constituents.

a) <u>COMPOSITIONS OF AAMRA PHALA</u>[6]

Various Macronutrients like carbohydrates, proteins, amino acids, lipids, fatty, and organic acids and Micronutrients (vitamins and minerals), Phytochemicals (phenolic, polyphenol, pigments, and volatile constituents) are present in Aamra

b) <u>CHEMICAL COMPOSITION</u>[7]-

I. **Apakwa Aamra phala**-

21% (Water), 61.5% water soluble constituents, Cellulose 5% etc
Ash Content- 0.23%, Carbohydrates- 5.83%, Proteins- 0.83%, Saponification value- 15.10, Iodine values -0.49, Vitamin C - 2.49%, Vitamin B - 0.09%, Vitamin A - 7.7 x 10-

5%, Sodium- 0.19%, Potassium-0.12%, Calcium-32.02%, Magnesium-2.5%, Phosphorous-20.79%, Iron-3.91%

II. **Pakwa Aamra phala:** Saitric acid and starch, water content - 82.9%, Ash Content-1.2%, Carbohydrates- 14.75%, Proteins- .05%, Saponification value- 3.53, Iodine values -17.23, Vitamin C- 0.04 %, Vitamin B - 0.13%, Vitamin A - 39.4%, Sodium-3.44%, Potassium-3.44%., Calcium-3.44%., Magnesium-3.44%., Phosphorous-3.44%., Iron-3.44%.

III. **Aamra phala Twak / Peel of Mango fruit:** Tanin (16% - 20%).

IV. **Aamra Beejamajja /Seed kernel:** Gallic and Tannic acid, Fat, Sugar, Gum, Starch.

V. **Aamra phala magaj / Fruit juice:** Vit C, and A.

VI. Rasapanchaka Of Aamra phala (Mangifera indica L.)

Table no 1- Rasapanchaka of Apakwa Aamra phala (Unripe Mango)

Apakwa Aamraphala- Unripe Mango					
Literature	**Rasa**	**Guna**	**Veerya**	**Vipaka**	**Effect on Doshas**
B.N.	Amla	Laghu, Ruksha,	Ushna	Amla	Vaatapittakar
K. N	Kashaya, katu, amla	Ruksha	Ushna	Amla	Vaatapittakar
D V	Amla	Laghu, Ruksha,	Ushna	Amla	Tridoshkar
DB	Amla	Laghu, Ruksha	Ushna	Amla	Tridoshkar
SS	Amla	Laghu, Ruksha	Ushna	Amla	Tridoshakaraka

***Abbreviations used** –
B.N.-Bhavprakash Nighantu [8], K.N.- Kaiyadev Nighantu[9] DV-Dravyaguna Vigyan[10], DB-Data base[11], SS- Sharangdhar Samhita[12]

Table no 2- Rasapanchaka of Pakwa Aamra phala (Ripe Mango)

Pakwa Aamraphala- Ripe Mango					
Literature	**Rasa**	**Guna**	**Veerya**	**Vipaka**	**Effect on Doshas**
B.N.	Madhur	Guru, Snigdha	Sheet	Madhur	Vaataapittahara
K.N	Madhur, amla, Kashaya	Guru, Snigdha	Sheet	Madhur	Pittakar, vatahara
DV	Mdhur, Amla	Guru snigdha	Sheet	Madhur	Vaatpittashamak
DB	Madhur	Guru,snigdha	Sheeta	Madhura	Vaatpittashamak
SS	Madhur	Guru,snigdha,	Sheet	Madhura	Vatapittashamaka

***Abbreviations used** –

B.N.-Bhavprakash Nighantu8, K.N.- Kaiyadev Nighantu[9], DV-Dravyaguna Vigyan[10], DB-Data base[11], SS- Sharangdhar Samhita[12]

3) Pharmacological Action Aamra Phala (Mangifera indica L.)

Table no 3 -Pharmacological Action (Rogaghnata) of Aamra (Mangifera indica L.) [13,14,15,22]

Parts of Mango	Literature	Research study
Aamra Phala twak (Peel)	Krumighna, Shothaghna, Vranaropana	antimicrobial, anti-diabetic, anti-inflammatory, anti-CA properties
Aamra phala magaj (Pulp)	Hrudya, Shonitasthapana, Balya, Bruhana, Vrushya	Source of Natural Antioxidant and Antimicrobial Action
Aamra beejmajja (Seed kernel)	Krumighna, Garbhashaya, Shothaghna, Atisaraghna, Mutr-Purish Sangrahniya, Sweta-rakta pradarnaashak, Raktarodhaka Vranaropaka, Stambhana[16]	Antioxidant, Antibacterial, anti-inflammatory activity
Apakwa AamraPhala (Unripe Mango)	Deepan, Ruchikar, Trushna-daaha shamak, Daahashamak	Dysentery ophthalmia, eruptions, and vaginopathy
Pakwa Aamraphala (Ripe Mango)	Snehan, Anuloman, Rhudya, shonitsthapan, Vrushya, balya, varnya, bruhan	anorexia, dyspepsia, cardiopathy, haemoptysis, haemorrhages from uterus, lungs and intestine, emaciation, and anaemia.

9) Phytochemistry of Aamra phala (Mangifera indica L.)

Table no 4- Phytochemistry of Aamraphala (Mangifera indica L.)[17 to 26]

Sr. No	Activity	Active compound	Part used
1	Antioxidant Activity	3,4-Dihydroxybenzoic acid (protocatechuic acid), Kaempferol, Linalool, Mangiferin, Quercetin, β-Carotene	Peel, pulp
2	Anti-Inflammatory Activity	5-(11Z-Heptadecenyl)-resorcinol, 5-(8, Z,11, Z-Heptadecadienyl)-resorcinol, Kaempferol, Mangiferin, Shikimic acid	Peel, pulp
3	Antimicrobial Activity	Kaempferol, Mangiferin, Quercetin, 3,4-Dihydroxybenzoic acid (protocatechuic acid)	Peel, pulp
4	Anti-Diabetic, Anti-Obesity Activity	Kaempferol, 3,4-Dihydroxybenzoic acid (protocatechuic acid), Mangiferin, Quercetin, β-Carotene,	Peel, pulp

5	Cytotoxic, Apoptotic Activity	Kaempferol, Linalool, Mangiferin, Quercetin, β-Carotene,3,4-Dihydroxybenzoic acid (protocatechuic acid), Mangiferin, Gallic acid	Fruit, pulp, seed
6	Neuroprotective Activity	Linalool, Mangiferin	pulp
7	Cardio-Protective	Mangiferin	pulp
8	Anticoagulant/ Antithrombotic	Shikimic acid	pulp
9	Blood-Pressure-Lowering Activity	Quercetin	pulp
10	Gastro-Protective	Mangiferin	Seed
11	Antiviral	Mangiferin	peel, seed, and kernel
12	Anthelmintic and anti-allergenic activity	Vimang and Mangiferin	peel, seed, and kernel
13	Antiparasitic activity	Mangiferin	peel, seed, and kernel
14	Antibone resorption	Mangiferin	peel, seed, and kernel
15	Anti-tumor-anti-HIV	Mangiferin	peel, seed, and kernel
16	Chemo preventive agent	Mangiferin	peel, seed, and kernel
17	Immuno-modulatory	Mangiferin	peel, seed, and kernel
18	Anti-diarrhoeal	Mangiferin	peel, seed, and kernel
19	Anti-bacterial and antifungal activity	Mangiferin	peel, seed, and kernel
20	Hepatoprotective	Mangiferin	peel, seed, and kernel

9) Therapeutic Use of Aamra phala (Mangifera indica L.)

Table no 5- Therapeutic indications of all parts of Aamra (Mangifera indica L.)[17 to 26]

Sr. No	Kalpa	Indication	Part Used	Reference
1	Lodhradi churna	Pakwatisarhara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Atisaar rogadhikaar (Shlok24/ Page 403)

2	Samangadi yoga	Pakwatisarhara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Atisaar rogadhikaar (26/404)
3	Vishavleha	Atisaarhara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Atisaar rogadhikaar (46/pg 412)
4	Jambvadya Tail	Vranahara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Upadansha rogadhikaar (45/pg 652)
5	Palit Nashak Lepa	Palitahara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Kshurarogadhikaar (3/pg 682) Sarangdhara[28](UK11/28-29/ pg 260)
6	Darunak Nashak Lepa	Darunakahara	Aamra beejmajja (Seed kernel)	Bhavprakasha [27] Madhyam khanda, Kshurarogadhikaar 17/pg 683) Sarangdhara[28](UK11/19/ pg 259),
7	Vrihada gangadhara churna,	Sarwatisaargrahani prashamnam	Aamra beejmajja (Seed kernel)	Sarangdhara[28] (MK-6/53-55) Bhavprakasha[27] (33/404)
8	Amrabeejamajja swarasa	Ghraanpravrutta rakte	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Chi. 3/80/ pg 21)
9	Aparajit Khad	Deepan, Pachan, Ruchya, Grahi	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Atisaar chikitsa 11/8/ pg 69),
10	Palitaghna Lepa	Palit hara	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Uttartantra, Shiroroga pratishedhadyaya, 28/44/pg293)
11	Mahanila taila	Urvdhvajatrugat vyadhi, Palithara	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Uttartantra, Shiroroga pratishedhadyaya, 28/53/pg293)
12	Pushyanuga churna	Arsha, Atisaar, Saraktamalapravartana.	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Uttartantra, Guhyaroga pratishedhadyaya, 39/61/pg338)
13	Dhatakyadi taila	Vilupta, Upapluta yogi	Aamra beejmajja (Seed kernel)	Ashtang Sangraha[29] (Uttartantra, Guhyaroga pratishedhadyaya, 39/69/pg339)

14	Anantadi gruta	Grahajita	Aamra beejmajja (Seed kernel)	Ashtang Hrudaya[30] (Uttartantra, Balagraha pratishedhadyaya, 3/50/pg905)
15	Pathadi churna	Atisaar	Aamra Amta twacha	Bhavprakasha [27] Madhyam khanda, Atisaar rogadhikaar (Shlok 41/ Page 405)
16	Jamwadi Rasa	Raktatisaar	Aamra Pallav	Bhavprakasha [27] Madhyam khanda, Atisaar rogadhikaar (Shlok 56/ Page 406)
17	Aamrasa	Pleehanashana	Amara Phala Magaj (Pulp)	Bhavprakasha [27] Madhyam khanda, Pleehayakrut rogadhikaar (Shlok 16/ Page 575)
18	Nyagradhadi churna	Prameha pitika	Aamara Phala churna	Bhavprakasha [27] Madhyam khanda, Prameha rogadhikaar (Page 599)
19	Bilvadi lepa	Durgandha hara	Aamra Pallav	Bhavprakasha [27] Madhyam khanda, Prameha rogadhikaar (shloka 76 & 80 ,Page 607)
20	Sahacharadi taila	Danta Thairya , Mukharoga	Aamara Phala churna	Bhavprakasha [27] Madhyam khanda, Mukharoga rogadhikaar (shloka 48 ,Page 729)
21	Patoladi kwatha	Mukha dhavan in Mukharoga	Aamra Pallav	Bhavprakasha [27] Madhyam khanda, Mukharoga rogadhikaar (shloka 172, Page 738)
22	Aamrajambu Twak kwath	Grahani Roga in Garbhini	Aamra twak	Bhavprakasha [27] Madhyam khanda, Garbhini chikitsa rogadhikaar (shloka 4, Page 754)
23	Aamra paak	Vrushya	Amara Phala Magaj (Pulp)	Bhavprakasha [27] Uttar khanda, Vajikaran adhikaar (shloka 41-48, Page 779)
24	Aamra Dhataki pushpa varti	Anjan, Netraroga	Aamra Pushpa (Manjiri)	Ashtang Sangraha[29] (Uttartantra, Netraroga vidnyaniya 20/32/pg261)

OBSERVATIONS-

1. Unripe Aamra phala is having Deepan, Ruchikar, Trushnadaaha shamak, Daahashamak action due to its Amla rasa, Amla vipaka, Ushna Veerya and Laghu ruksha guna

2. Ripe Aamra phala is having Snehan, Anuloman, Rhudya, shonitsthapan, Vrushya, balya, varnya, bruhan property due to its Madhur Rasa, Madhur vip[aak, Sheeta veerya and Guru, snigdha guna.
3. Active compound of Aamra phala, Mangiferin (Polyphenol) has antitumor, immunomodulatory, antidiabetic, antibacterial, antiviral, antioxidative, anthelminthic, antiallergic, anti-HIV, and anti-inflammatory activity.
4. According to Ayurvedic literature Aamra beejmajja (Seed kernel) has Krumighna, Garbhashaya, Shothaghna, Atisaraghna, Mutr-Purish Sangrahniya, Sweta-rakta pradarnaashak, Raktarodhaka Vranaropaka, Stambhana action.
5. Aamra Phala twak (Peel) has Krumighna, Shothaghna, Vranaropana action.
6. Aamra phala magaj (Pulp) has Hrudya, Shonitasthapana, Balya, Bruhana, Vrushya guna.
7. All parts of Aamra ie Ammra manjiri, Aamra phala twak, Aamra beejmajja, Aamra Phala Magaj, Aamra patra are used therapeutically.
8. Some Formulations of all parts of Aamra are mentioned in table no.5 showing its Therapeutic properties.

DISCUSSION:

According to Ayurvedic literature Ripe and Unripe Aamra phala is having different medicinal properties. Research studies of Mangiferin (Polyphenol) has maximum pharmacological activities. Amara phala as a whole is the best sources of nutrient, such as carbohydrates, proteins, and fatty acids. Aamra Phala twak (peel) is containing pectin, dietary fibre, vitamins, carotenoids, and phenolic compounds, having health-promoting effects. Aamra Phala magaj (pulp) is also a good source of micronutrients such as calcium, phosphorus, iron, and vitamins (vitamins C and A). Aamra beejmajja (Seed Kernel) is having Antioxidant, Antibacterial, anti-inflammatory activity.

CONCLUSION:

Based on these literature and research studies indicates that all the three parts of Aamra phala have nutritional value and medicinal action. Aamra phala as whole is having Nutritive as well as curative benefits at both the stages also ie. Unripe and ripe stage. According to these findings can be stated as Aamra phala as a Mahabhaishajya, a complete food with medicinal effect.

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