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PHYSICO CHEMICAL ANALYSIS OF AAMRABEEJA (LINN. MANGIFERA INDICA)

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1. ABSTRACT

Indeed, Ayurvedic remedies, known for their natural approach and holistic principles, offer a potential solution to address healthcare demands. Choosing for plant-based medicines or phytomedicines often implies a commitment to formulations without synthetic chemicals. The variance in the quality of drugs between ancient and modern times can be attributed to factors like improper processing, adulteration, or the use of low-quality raw materials. The aim of the study is standardization of *Amrabeeja* (kernel) collected from various sources. In the course of this study, an array of essential analytical tests, such as foreign matter, Organoleptic test, Particle size, pH, Loss on drying, Total ash, Acid insoluble Ash, Water soluble extractive, and Alcohol soluble extractive were conducted. The obtained values of the samples are compared with the standard limits specified in The Ayurvedic Pharmacopoeia of India for *Amrabeeja* establishing a basis for quality assessment. The acquired parameters for Loss on drying (mean -9.266 with S.D +/- 0.758), Total Ash (mean - 2.613 with S.D +/- 0.065), Acid insoluble ash (mean-0.363 with S.D +/- 0.082), ASE (mean-19.45 with S.D +/-1.751), WSE (mean-19.723 with S.D +/- 2.334), pH (mean-5.203 with S.D +/- 0.039) were within the standard limits stated in API. Therefore, this study can serve as a reference for future research initiatives.

2. KEYWORDS: *Amrabeeja*, *kernel*, Mangifera indica, physico chemical, standardization.

3. INTRODUCTION

Ayurveda, an ancient Indian system of medicine, promotes holistic well-being through herbal remedies and lifestyle practices, showcasing a profound connection to the country's diverse flora and traditional knowledge, evident in texts like the Rigveda. The global shift towards plant-based medicines aligns with Ayurveda's principles, emphasizing sustainable and holistic healthcare solutions.

Plant based products are increasingly popular for medicinal use, available over the counter. Despite this, almost four fifth global population relies on herbs for basic healthcare. Herbal formulations used in health issues, requires standardization. Standardization ensures consistent quality in herbal drug production, involving authentic analytical methods. Quality and standardization are crucial in the growing herbal products. This has led to the necessity of standardizing raw materials to uphold the therapeutic effectiveness of drugs.

Fruits, rich in essential nutrients and antioxidants, play a vital role in promoting health by reducing the risk of various diseases, aiding digestion, and contributing to overall longevity. Here, Mangifera indica, or Mango, belonging to the Anacardiaceae family. Beyond symbolism, Mango, known as "Aamra,". Mango seed kernels are rich in various phytochemicals such as phytosterols, carotenoids, tocopherol, polyphenols (including mangiferin, hesperidin, vanillin, penta-o-galloyl-glucoside, rutin, quercetin, kaempferol, etc.), and phenolic acids (like gallic acid, caffeic acid, ellagic acid, ferulic acid, etc.). These compounds contribute to the seeds' antioxidant, anticancer, antimicrobial, antidiabetic, and antiplatelet aggregation properties. Mango kernel also showed antimicrobial activity.[1] It comprises significant amount of malic acid, sugars, resin, ash, and starch.[2]

In Ayurveda, ripe Mango (Pakwa Aamra) is recognized for Vata-Pitta Shamaka qualities, while the unripe fruit (Apakwa) is considered Tridoshakara, as detailed in classical texts like Charak Samhita, Sushruta Samhita, Ashtanga hridaya, Shodhala Nighantu. *Amrabeeja* has Kashaya, Madhura, slight amla rasa[3] and has therapeutic properties like krimighna, gharbhashaya shothaghna, mutrasanghraniya, purishasanghraniya, raktapradara, Shwetapradara, chardi, atisara, hrud dahaghna.[4]

Therefore, there is essential requirement of authentication and standardization to prevent the adulteration of the drug. The current study focuses on standardization of *Amrabeeja* collected from local vendors. After obtaining authentication, the samples were tested for physico chemical analysis in the quality control laboratory. Analysing *Amrabeeja* samples involves comparing them with authentic sources to establish benchmarks.

4. AIM

To standardise *Amrabeeja* (Mangifera indica Linn.) through physico chemical analysis.

5. OBJECTIVE OF THE STUDY

To analyse *Amrabeeja* physio-chemically according to standard parameters.

6. MATERIALS AND METHOD

A) Materials

Raw drug: -*Amrabeeja* was collected from various sources in coarse form.

Table no. 1: Equipment.

Weighing balance	Watch glass	Funnel
Iodine flask with stopper	Magnetic stirrer	Spatula
Tissue paper	Measuring cylinder	Dropper
Muffle furnace	Forcep	Thermometer
Magnet	Water bath	Tripod
Stirrer	Beaker	Petri dish
Oven	Magnifying glass	Whatman filter
Tongs	pH meter	

Reagents: -Chloroform water, ethanol, Dilute Hydrochloric acid, Distilled water, Buffer solution 4 & 7, n-Butanol, Acidic acid, water.

B) Method

1. **Raw drug collection: -** *Amrabeeja* (mango kernel) of three distinct samples were collected from local vendors.

2. **Authentication: -** The initial step in the standardization process involves the collection and authentication of the raw drug.

The amra, obtained in dry form from various sources, underwent authentication tests at the Central Research Laboratory conducted by the Dravyaguna Department at YMT Ayurvedic Medical College and Hospital, Kharghar, Navi Mumbai, Maharashtra.

3. **Standardization: -** After authentication from the Dravyaguna department, the standardization process was conducted in the in-house (Central Research Laboratory) at YMT Ayurvedic Medical College and Hospital, Kharghar, Navi Mumbai.

The values obtained from the samples were compared with the standard limits specified in the API.[5]

3.1 Organoleptic examination of *amrabeeja*

In this process, properties such as color, odour, taste and appearance of the *Amrabeeja* (Mangifera Indica Linn) were observed and tabulated further.

3.2 Foreign matter

Total 100 grams of each sample was taken and placed them on a plain white surface in a tray, and proceeded to separate and measure physical impurities such as stones, sand, and soil particles using both naked eyes and a magnifying glass.

3.3 Loss on drying

Loss on drying was determined by weighing 5 grams of the *Amrabeeja* powder (Mangifera Indica Linn) in a petridish. Subsequently, it was placed in a hot air oven at 105°C for 5 hours and periodically weighed. The drying and weighing process was repeated at one-hour intervals until a constant weight was achieved.

3.4 Total ash

Total ash was determined by weighing 2 grams of the sample *Amrabeeja* (Mangifera Indica Linn) in a silica crucible. The silica crucible was then placed in a muffle furnace, not exceeding 450°C, until carbon-free ash was obtained. After cooling in a desiccator, the weight was measured, and the percentage of ash was calculated based on this weight.

3.5 Acid-insoluble ash

The ash obtained from total ash was boiled with 25ml of dilute Hydrochloric Acid until it reaches a simmering state and then filtered through ashless filter paper i.e. Whatman filter paper 41 and washed it with hot water. The ash-free filter paper, along with its contents, underwent incineration in a preconditioned muffle furnace until carbon-free ash was obtained. Then cooled in desiccator and weighed. Percentage of acid-insoluble ash was calculated.

3.6 Alcohol soluble extractive

A 5 g finely powdered *Amrabeeja* (Mangifera Indica Linn) was mixed with 100 ml of ethanol in a closed iodine flask with a magnet, undergoing intermittent stirring on a magnetic stirrer for six hours and allow standing for eighteen hours. After completing 24 hours, the mixture was filtered with precautions against solvent loss through filter paper. Subsequently, 25 ml of the filtrate was placed in a preconditioned petridish and evaporated on a water bath at 105°C until dry. After cooling in a desiccator, the residue was measured to calculate the percentage of alcohol-soluble extractive.

3.7 Water soluble extractive

A 5 g finely powdered *Amrabeeja* (Mangifera Indica Linn) was mixed with 100 ml of chloroform water in a closed iodine flask with a magnet, subjected to intermittent stirring on a magnetic stirrer for six hours, and allow standing for eighteen hours. After completing 24 hours, the mixture was filtered with precautions against solvent loss through filter paper. Subsequently, 25 ml of the filtrate was placed in a preconditioned petri dish and evaporated on a water bath at 105°C until dry. After cooling in a desiccator, the residue was measured to calculate the percentage of aqueous-soluble extractive.

3.8 pH

A 1% solution was created by combining 50 ml of distilled water with 500 mg of powdered *Amrabeeja* (Mangifera Indica Linn). This mixture stood still, covered by a watch glass, for 4 hours. Following the calibration of the pH meter with buffer solutions of pH 4 and pH 7, the samples were examined, and readings were recorded.

3.9 Thin layer chromatography

TLC is a separation technique where a solute interacts with a stationary phase and a mobile phase (solvent). This differential interaction leads to the separation of components based on their affinity for the phases. Here pre-coated silica gel plates are used.[6]

Preparation of mobile phase: -: n-Butanol: Acidic acid: water (4:1:5) A.P.I[7]

Preparation of solute (alcoholic extract of *Amrabeeja*): - 5 gm coarse *Amrabeeja* and 50 ml ethanol was taken in conical flask. Kept it for 24 hours.

7. OBSERVATION AND RESULTS

The organoleptic examination and observed physico chemical test are described below in

table 2 and table 3.

Table 2: Observed organoleptic characters of *Amrabeeja* (Mangifera indica Linn).

Sr. no.	Organoleptic characters	Sample 1	Sample 2	Sample 3
1	Colour	Creamish	Creamish	Creamish
2	Odour	Characteristics	Characteristics	Characteristics
3	Taste	Bitter & astringent	Bitter & astringent	Bitter & astringent
4	Touch	Fine powder	Fine powder	Fine powder

Table 3: Observed physio-chemical analysis value of Amrabeeja (Mangifera indica Linn).

Sr. no	Parameters	API values	Sample 1	Sample 2	Sample 3
1	Foreign matter	NMT 1%	Nil	Nil	Nil
2	Loss on drying (LOD)	Not mentioned in API	8.2%	9.7%	9.9%
3	Total ash (TA)	*NMT3%	2.7%	2.6%	2.54%
4	Acid insoluble ash (AIA)	NMT 0.5%	0.25%	0.4%	0.44%
5	Alcohol soluble extractive (ASE)	NLT 10 %	17.03%	21.12%	20.2%
6	Water soluble extractive (WSE)	NLT 10%	23.02%	17.92%	18.23%
7	pH	Not mentioned in API	5.15 at 31^0C	5.22 at 28.7^0C	5.24 at 29^0C

*Not more than-NMT

* Not less than NLT

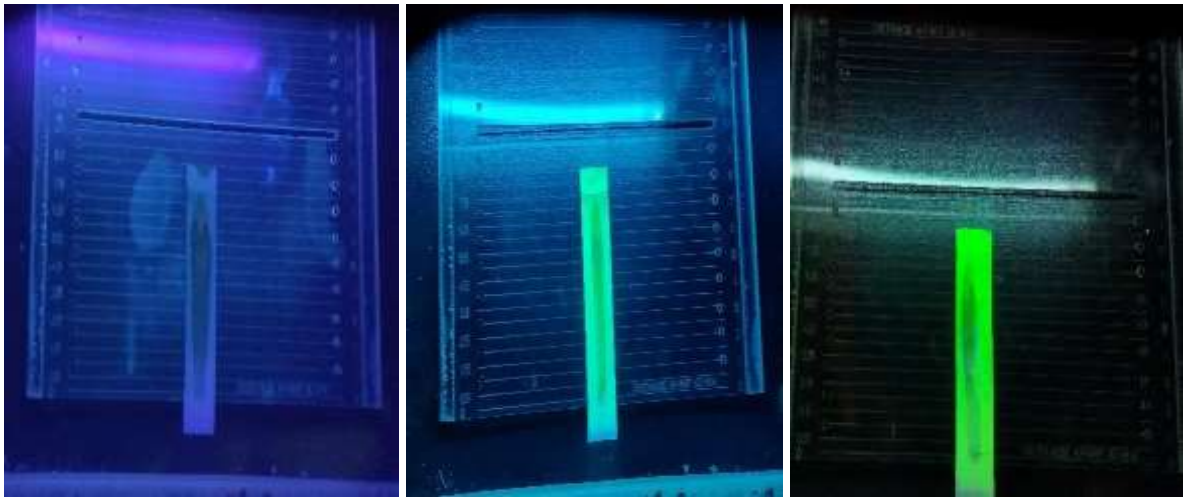
Table 4: Mean and standard deviation of all three samples.

Parameters	Mean value calculated	Standard deviation calculated
LOD %	9.266	0.758
TA %	2.613	0.065
AIA %	0.363	0.082
ASE %	19.45	1.751
WSE %	19.723	2.334
pH %	5.203	0.039

Table 5: Observed values of thin layer chromatography - Exposure to solvent n-Butanol: Acidic acid: water (4:1:5).

U.V (365nm)	API RF VALUE	Sample 1	Sample 2	Sample 3
Yellow	0.62	0.66	0.6	0.46
Blue	0.92	0.8	0.72	0.6
Yellow	-	-	0.86	0.73

Sample 1 **Sample 2** **Sample 3**



Sample 1 **Sample 2** **Sample 3**

Table 6: Observed values of thin layer chromatography - Exposure to iodine vapour.

Spots	A.P.I RF VALUE	Sample 1	Sample 2	Sample 3
1	0.07	0.60	0.2	0.2
2	0.29	0.66	0.6	0.26
3	0.62	0.66	0.72	0.4
4	0.77	0.73	0.86	0.46
5	0.93	0.8	-	0.6

8. DISCUSSION AND CONCLUSION

It's true that medicinal plants are gaining popularity for their non-toxic nature, fewer side effects, and cost-effectiveness, making them appealing to both rural and urban communities in India. The growing demand in developed countries reflects a global interest in plant-based products for health and wellness. Hence, the current necessity for standardizing crude drugs and herbal formulations through the implementation of quality control parameters has become important to ensure consistency and safety in the utilization of medicinal plants. The present study focuses on assessing the physico chemical characteristics of *Amrabeeja* majja (Linn Mangifera Indica) by analytical test.

- In organoleptic test all three samples shows similar Colour (Creamish) Odour (Characteristics), Taste (Bitter), Touch (Fine powder).
- The moisture content plays a crucial role in influencing the processability, shelf-life, usability, and overall quality of a product. The determination of moisture content plays a crucial role in influencing the processability, shelf-life, usability, and overall quality of a product. The calculated loss on drying value for 3 samples was the lowest. The calculated mean was 9.266 with S.D +/- 0.758 suggesting that it contained the least moisture among the samples. Hence all the 3 samples fulfil the moisture content parameter.
- Total Ash value, contains the residue after incineration, used to assess the quality and purity of powdered drugs. It eliminates organic matter, leaving ash. A high ash value indicated adulteration or contamination. Here the calculated mean for TA was 2.613 with S.D +/- 0.065. According to API all 3 samples has TA value NMT 3%. Hence the 3 samples meet the standards of quality and purity.
- To identify the adulteration and impurities which are not soluble in acid, acid insoluble ash test is performed. The calculated mean was 0.363 with S.D +/- 0.082 and the observed value of AIA for 3 samples was within the standard limit mentioned in API i.e. NMT 0.5%.
- ASE & WSE determines the nature of constituents extracted with the solvent during the extraction process. Here the mean calculated for ASE was 19.45 with S.D +/-1.751 and for

WSE was 19.723 with S.D +/- 2.334. In API the standard value mentioned for ASE & WSE of 3 samples should be NLT 10%.

- The acidic and alkaline nature of 3 samples was observed and the mean value obtained was 5.203 with S.D +/- 0.039 which indicated that the 3 sample was acidic in nature.
- The thorough inspection under a magnifying glass confirmed the absence of any noticeable physical impurities or adulteration, establishing the samples as genuinely standardized.

CONCLUSION

- *Amrabeeja* 3 samples were collected from different sources and undergone physico chemical analysis to rule out any adulteration or efficacy of the drug. For the same authentication and standardization tests for 3 samples was performed.
- The parameters for 3 samples were further compared with the standards mentioned in the API and noted. For 3 samples, foreign matter, LOD %, TA %, AIA %, ASE %, WSE %, pH test was carried out. All the values observed was within the standard limits of the given in API.
- Also, TLC was performed for three samples which was exposed to solvent phase and iodine vapour. In which sample 2 shows yellow and blue zones were visualized.
- From this study it can be concluded that all three samples are almost same to the standard limits given in API and hence can be used for study process.

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