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Review Article

Semecarpus anacardium Linn. *(BHALLATAKA):* VALIDATION OF AYURVEDIC PHARMACOLOGY THROUGH MODERN STUDIES

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ABSTRACT

Bhallataka (*Semecarpus anacardium* Linn.), commonly known as the Marking Nut, is one of the most important classical herbal drugs being used for therapeutic purposes since time immemorial. It is one of the most trusted *Rasayana* drugs celebrated for its potent *Vata Kapha* pacifying properties. At the same time, it has been considered to be vesicant like fire due to presence of sharp and penetrating sap in its fruits. Characterized by its sharp (*Teekshna*) and fire-like (*Agni*) properties, it is traditionally indicated for a wide array of disorders, including *Arsha* (hemorrhoid's), *Kushtha* (skin diseases), *Gulm* (abdominal lumps), and *Vata-Kapha* dominant conditions. This wonderful drug has established identity beyond doubt and abundantly available in hotter parts of India and across the globe. Thus, *Bhallataka* has potential to be the focus drug in present era when identity of large number of classical drugs is doubtful and those having undoubtful identity are under immense pressure due to over exploitation in their natural abode. Present review is an effort to have an in-depth exploration pharmacological properties and therapeutic potential of *Bhallataka,* bridging ancient Vedic and classical Ayurvedic wisdom with evidences from contemporary scientific studies. A critical analysis of role of *Shodhana* (purification) using different media to neutralize the toxicity of its corrosive urushiol's and anacardic acids, transforming them into therapeutically active compounds such as anacardol is being also done. Comparative critical analysis of traditional claims with contemporary scientific findings published in various journals establish necessity for judicious administration and standardized processing to harness the "nectar-like" potential of *Bhallataka* in global integrative healthcare.

INTRODUCTION

Traditional Indian medicine systems, such as Ayurveda and Siddha, have historically utilized plant-derived products to manage various diseases. *Semecarpus anacardium* Linn. (*Bhallataka*) is a common plant in Ayurvedic medicine, located in central and sub-Himalayan India. *Bhallataka,* frequently referred to as marking nut, is a member of the Anacardiaceae family. In the Indian medical system, it has numerous therapeutic uses. *Bhallataka* nut preparations have been used as indigenous medicine from ancient times.

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According to Ayurvedic texts, *Bhallataka* is used to treat a variety of illnesses and has certain common characteristics. *S. anacardium* fruits are attached to the receptacle, considered as false fruit. The color of the false fruit is green in the unripe stage and turns yellowish-orange on ripening. Fruit is drupaceous, laterally flattened, obliquely ovoid, 2.5–3cm in length, and is green when unripe, turns blackish brown when ripe. The nature of the fruit is smooth and shining with a residual receptacle. Cotyledon is white in color and is 1–1.5cm long. Microscopic studies with Sudan III have revealed that a large amount of oil is present in the pericarp. Tarry oil, present in the pericarp of the fruit causes blisters on contact. The corrosive sap from the pericarp of the fruit contains catechol, fixed oil, and anacardol ($C_{18}H_{13}O_3$.COOH). Corrosive properties of the sap are due to presence of

two phenolic acids, $C_{16}H_{15}O_3$.COOH and $C_{14}H_{13}O_3$.COOH.[1]

MATERIAL AND METHOD

A comprehensive review of the literature has been done. In order to gather knowledge about the pharmacotherapeutic potential of various plant parts, an extensive review of texts starting from ancient Vedic and Ayurvedic texts to contemporary scientific publications, including indexed and peer-reviewed journals has been undertaken. The data gathered from various sources have been critically analyzed.

RESULTS

On reviewing the available Vedic, classical, and contemporary texts, it was observed that the ripe fruits of *Semecarpus anacardium* Linn. has been identified as the botanical source of the classical drug *Bhallataka* by scholars of Ayurveda. References regarding use of *Bhallataka* could not be worked out in vedic texts.

Bhallataka in Ancient Texts of Ayurveda

Bhallataka is one of the most frequently utilized medicinal plants for therapeutic purposes in classical texts of Ayurveda including both *Samhita* and *Nighantu* (Ayurvedic Pharmacopeia) texts. Acharya Charak has classified it in *Deepniya Mahakashaya* (*Bhallatakasthi* – Seed coat of *Bhallataka*), *Kushthaghna* (group of ten drugs indicated in skin diseases) and *Mutra Sangrahaniya Mahakashaya* (group of anti-diuretic drugs) in fourth chapter of *Sutra Sthan*. (CS.Su.4.6,13,33)[2]. Acharya Sushruta has considered is one of the best two drugs for the pacification of *Arsha* (hemorrhoids).[3] Furthermore, Acharya Vagbhatt has included *Bhallataka* in the *Agrya Dravya Sangraha* (best among the class drugs) for the treatment of *Arsha* (hemorrhoids) (AH.U.40.49).[4]

Synonyms of *Bhallataka*

In texts of Ayurveda, morphological description of drugs has not been given instead they have been described with the help of various descriptive synonyms signifying various aspects of drugs like morphology, pharmacological properties, therapeutic potential etc. *Bhallataka* has also been referred with various synonyms. Main synonyms of *Bhallataka* used in classical texts of Ayurveda have been listed in table 1.

Table 1: Synonyms of *Bhallataka*

S.No.	Synonyms \Texts	A. Ni.[5]	P. R. [6]	D. Ni. [7]	Ma. Ni.[8]	So. Ni.[9]	Ni. S. [10]	K. Ni. [11]	R. Ni.[12]	MP.Ni.[13]	BP. Ni.[14]	Sr. Ni.[15]
1.	*Bhallataka*	+	+	+	+	+	+	+	+	+	+	+
2.	*Arushkar*	+	+	+	+	+	+	+	+	+	+	+
3.	*Shophkrit*	+	-	-	-	+	-	+	-	-	+	+
4.	*Agnimukhi*	-	-	-	-	+	+	+	-	+	+	+
5.	*Veeravriksh*	-	-	-	-	-	-	-	-	+	+	+
6.	*Veertaru*	-	+	+	+	+	+	+	+	+	-	+
7.	*Bhalli*	-	-	-	-	+	+	+	-	-	+	+
8.	*Anala*	-	-	-	-	-	-	+	+	-	-	-
9.	*Vrankrat*	-	+	-	-	-	-	+	-	-	-	-
10.	*Sphothetu*	-	-	-	+	+	-	+	-	-	-	-
11.	*Krimighna*	-	-	-	-		-	-	+	-	-	-
12.	*Agnika*	-	-	+	+	+	-	-	+	-	+	-
13.	*Dhana*	-	-	+	+	-	-	-	+	-	-	-
14.	*Vatari*	-	-	+	-	-	-	-	+	-	-	-
15.	*Tapan*	-	-	+	+	+	-	-	+	+	-	-
16.	*Dhanu*	-	-	-	-	+	+	-	-	-	-	-
17.	*Ranjaka*	-	-	-	-	+	-	-	-	-	-	-
18.	*Snehbeeja*	-	-	-	-	+	-	-	-	-	-	-
19.	*Raktaphala*	-	-	-	-	+	-	-	-	-	-	-
20.	*Bhedan*	-	-	-	-	+	-	-	-	-	-	-
21.	*Sphotbeejak*	-	-	-	-	-	-	-	+	-	-	-
22.	*Dhanubeej*	-	-	-	-	-	-	-	+	-	-	-
23.	*Shothhrita*	-	+	-	-	-	-	-	-	-	-	-
24.	*Arshoghna*	-	-	-	-	-	-	-	-	-	-	+

Etymological Derivation of Some Important Classical Synonyms of *Bhallataka* [16]

Bhallataka- Sharp like javelin (*Bhalli*).

Dhanurbija- Fruits are obliquely ovoid.

Agnimukhi- Seated in a fleshy orange cup.

Taila-Bija- With oily nuts.

Aruskara/ Sophakṛt- The juice of the fruit produces blisters and swelling on touch.

Viravṛksa- It is a highly potent and sharp (*Bhallataka*).

Krmighna/Bhutanasana- A drug which kills worms and organisms.

Bhedana- It is useful in tumours.

Vatari- Useful in *Vatika* disorders

Ranjaka- Acts as a blackening agent.

Classical Pharmacological Properties (*Rasa-Panchak*), Therapeutic Indications and Formulations of Different Plant Parts of *Bhallataka*

Bhallataka is *Teekshna* (sharp/penetrating) like *Agni* (fire), which signifies vesicant properties of *Bhallataka*. At the same time, Acharya Charak considers it like *Amrit* (nectar) when used judiciously. Acharya Charak says "there are no disorders of *Kapha* and obstructive conditions which are not ameliorated by *Bhallataka* quickly". Moreover, it promotes intellect and *Agni*.[2] (CS.Ci.1.2.17,19) (AH.U.39.81,82).

Various plant parts of *Bhallataka* have been mentioned to be utilized for therapeutic purposes in classical texts of Ayurveda. Pharmacological properties of various plant parts have been described in classical texts. Going through the texts reflects that, unless mentioned otherwise, the term *Bhallataka* refers to the mature, ripe fruit of *Bhallataka.*[17] Pharmacological properties (*Rasa Panchak*) of mature unripe and ripe fruits of *Bhallataka,* according to various texts, are listed below in Tables 2 & 3, respectively.

Bhallataka has been reported to be used for several therapeutic purposes in classical texts of Ayurveda. In Charak Samhita, *Bhallataka* is mentioned in *Aragvadhadi Churna* / thirty-two *Sidhtam Churna Pradeha* (*Lepa*) (CS.Su.3.5). Plant parts indicated for therapeutic utilization in classical texts are listed below.

1. Fruit (mature unripe)
2. Fruit (mature ripe)
   i. Receptacle (*Maans, Vrant, Bhallataka Nibandhana* - Fleshy Thalamus)
   ii. Drupe
      a. *Bhallatakasthi* (seed cover)
      b. *Bhallatakamajja* / *Godumbi* (seed kernel)
      c. Oil
3. Leaves
4. Flowers (*Bhallataka Pushpa*)
5. Root

1. Fruit (Mature unripe)

Table 2: *Rasa-Panchak* of Fruit of *Bhallataka*

S.No.	Text name	*Rasa*	*Virya*	*Vipaka*	*Guna*
1.	*Dhanwantri Ni.*[7]	*Katu, Tikta, Madhur*	*Usna*	-	-
2.	*Kaiyadev Ni.*[11]	*Tikta, Kashaya, Madhur*	*Sheet*	*Katu*	*Laghu*
3.	*Raj Nighantu* [12]	*Kashaya, Madhur*	*Anusna*	-	-
4.	*Madanpal Ni.*[13]	*Kashaya*	*Usna*	*Madhur*	*Laghu*
5.	*Nighantu Kalpdrum* [18]	*Kashaya*	*Usna*	*Madhur*	*Laghu, Snigdha*
6.	*Bhavprakash Ni.*[14]	*Kashaya, Madhur*	*Usna*	-	*Laghu*
7.	*Rajballabh Ni.*[19]	*Kashaya, Madhur*	-	-	*Snigdha*
8.	*Nighantu Adarsha* [20]	*Kashaya, Madhur*	*Usna*	*Katu*	-

In *Kaiyadev Nighantu*, the mature fruit of *Bhallataka* has been considered to be *Sheet Virya* (cold in potency), whereas all other texts have considered it *Ushna Virya* (hot in potency).

2. Fruit (Mature Ripe)

Table 3: *Rasa-Panchak* of Ripe Fruit of *Bhallataka*

S.No.	Text name	*Rasa*	*Virya*	*Vipaka*	*Guna*
1.	*Kaiyadev Ni.*[11]	*Madhur*	*Sheet*	*Madhur*	*Guru, Ruksha*
2.	*Nighantu Kalpdrum* [18]	*Madhur, Kashaya*	*Usna*	*Madhur*	*Laghu, Snigdha, Teekshna*
3.	*Bhavprakash Ni.*[14]	*Madhur, Kashaya*	*Usna*	*Madhur*	*Laghu, Snigdha, Teekshna*

- According to Acharya Charak, the fresh juice of the *Bhallataka* fruit causes inflammation, and consuming *Bhallataka* with hot water constitutes a *Viruddha Aahar* (incompatible dietary combination) (CS.Su.18.4 & 26.84).

- The ripe fruit of *Bhallataka* is *Vistambha karaka* (constipation), *Dhatuvardhak* (tissue-nourishing), *Vata-Kapha Vardhak* (aggravates disease due to *Vata Dosa* and *Kapha Dosa*), *Sukrajanan* (spermatogenic), slow digesting, *Balkarak* (improves strength/immunity), alleviates *Rakapitta* (bleeding disorders) [*Kaiyadev Nighantu*] and also, is *Pachak* (digestive), *Chhedan, Bhedana* (purgative), *Medhya* (brain tonic/nootropic), and *Agnivardhaka* (increases digestive fire). It is indicated in different disease conditions like *Kapha*, *Vata*, *Vrana* (ulcer), *Udararoga* (diseases of abdomen/ascites), *Kustha* (diseases of skin), *Arsa* (hemorrhoid's), *Sangrahani* (malabsorption syndrome), *Gulma* (abdominal lumps), *Sotha* (inflammation), *Anaha* (distension of abdomen due to obstruction to passage of urine and stools), *Jwar* (fever), and *Krmi Roga* (worm infestations). [14,21]

i. Receptacle (*Maans,Vrant, Bhallataka Nibandhana* – Fleshy Thalamus)

- The fruit is attached to the receptacle. The receptacle is considered false fruit. The color of the false fruit is green in the unripe stage, and when it ripens, it turns yellowish-orange in color. The fleshy orange pulp of the *Bhallataka* fruit is *Madhur* in *Rasa* and *Sheet* in *Virya*[8,21] (CS.Su.27.165) and *Brimhan* (nourishing) (AH.Su.6.134). The Hypocarp- Fleshy orange cup eaten when ripe, is astringent.[12] Furthermore, according to *Rajballabh Nighantu,* the stalk of *Bhallataka* is *Madhura* (sweet), *Kashaya* (astringent) and *Vata Vardhaka* (increasing *Vata Dosa*)*;* conversely, according to *Bhavprakash Nighantu* and *Nighantu Kalpdrum, the* stalk is *Madhura*, *Kashaya* (astringent)*, Pittaghna* (alleviating *Pitta Dosa*), beneficial for hair and *Agnivardhaka* [19].
- Hypocarp is eaten when ripe and ethnomedicinally used in Piles and cough [22] and is considered good for the female reproductive system.[23]

ii. Drupe

***a. Bhallatakasthi* (Seed Cover)**

Table 4: Some Important Formulations of *Bhallatakasthi* and Their Indications

S.No.	Formulations	Indications
1.	*Bhallataka Taila*	*Krimighna* (Worm treatment) (CS.Vi.7.23)
2.	*Dantiyadi Lepa, Granthibhedan Lepa*	*Kaphaj Granthi* (Cyst due to *Kapha*) (CS.Ci.21.126), (AH.Ci.18.26,30)
3.	*Mahaneel Taila*	*Palitya* (Greying of hair) (CS.Ci.26.271)
4.	*Saindhavadi Taila*	*Gridhrasi* (sciatica), *Arsha* (hemorrhoids), *Urusthambha* (stiffness and immobility of thighs). (CS. Ci. 27.45)

- The pharmacological properties of *Bhallatakasthi* are *Kashaya* (CS.Vi.8.144) *Madhura* and *Tikta* (bitter) in *Rasa* (taste)*, Katu* (pungent) in *Vipaka* (intestinal digestion and tissue metabolism)*.* It is *Snigdha, Teekshna, Ushna* (hot in potency). Acts as *Chhedan, Bhedana, Medhya*, *Pachak* (digestive), *Agnideepak*, and is indicated for treating *Kaph, Vata, Vran* (ulcer)*, Udararoga, Kushtha, Arsa, Grahani* (malabsorption syndrome), *Gulma*, *Sotha*, *Anaha* (distension of abdomen due to obstruction to passage of urine and stools), *Jwar*, and *Krimi Roga*. [11,18,24]
- In *Hirdyadeepak Nighantu Bhallatakasthi* is mentioned in *Kapha-Vataghana Varga*.[25]
- The bark of the *Bhallataka* fruit is *Madhur, Katu* in *Rasa*, *Snigdha, Laghu* and *Kashaya, Pachak*.[18]
- *Bhallatakasthi* is like *Agni* (like fire) (CS.Su.27.165), *Medhya* (promotes intellect) and Alleviates both *Kapha* and *Vata Dosha* (AH.Su.6.134), *Laghu* and *Vatakapha-Nasaka*. [8,21]

b. *Bhallatakamajja* (Seed Kernel)

- *Bhallataka* Seed is mentioned in *Gajasthaadya Pralepa* indicated in *Arsha*, (CS.Ci.14.55), and a paste made from *Bhallataka*, *Pippali* and *Pippalimula*, when taken with honey, relieves *Urusthambha* (stiffness/immobility of thighs) (CS.Ci.27.32).
- According to *Raj Nighantu,* the kernel of the seed relieves emaciation and burning, alleviates *Pitta* and is imperative. It cures disorders of *Vata* and anorexia, improves appetite, and very quickly relieves the ailments due to *Pitta.*[12]
- The kernel of the *Bhallataka* fruit is *Madhura*, *Dhatuvardhak*, *Shukrajanaka* (spermatogenic) and pacifies *Vata* and *Pitta Doshas*.[11,14,18,24] Its pharmacological actions are *Brimhan* (nourishing), *Jatharagni-dipaka* (digestive fire-lighting), *Tarpana* (relieves thirst), *Sosha Nasak* (cures cachexia), *Pitta-Vata Nasak* (disease due to *Vata Dosa* and *Kapha Dosa*), indicated in *Aruchi* (anorexia), *Daha* (burning).[18,24]

c. Oil

- **Properties**- The oil is *Ushna Virya*, *Madhur* and *Kashaya Rasa*, and *Tikta Anurasa* (bitter in the aftertaste); it relieves *Vata*, *Kapha*, *Kushta*, *Medovrddhi* (overweight), urinary disorders, worm infestations, destroys *Dosha* in both the upper and lower parts (SS.Su.45.122).
- *Bhallataka Taila* has numerous variations, such as *Bhallataka Sneha* and *Majja Sneha*. According to Charaka Samhita, add one *Adhaka* of cow's milk and a paste (*Kalka*) of *Mulethi*, and cook *Bhallataka* oil. In this manner, repeatedly cook this oil- adding milk and the *Mulethi* paste each time- for a total of one hundred times. It acts as a *Rasayana* (CS.Ci.1-2.14,15) (a nutrient for body and mind with adaptogenic, immunomodulatory, neuroendocrine-modulating, and rejuvenating properties).
- In the Sushruta Samhita, it is specifically indicated for *Krishnakara* (for darkening of skin) (SS.Ci.1.89, 92 & SS.Ci.31.5). The formulation is also used for *Romashatana* (removal of hair) (SS.Ci.1.106), management of *Kustha* (leprosy or various skin diseases) (SS.Ci.9.6-7 & SS.Ci.10.14), and *Bhallataka Sneha* (or *Majja Sneha*) is prescribed as a *Rasayana Kalpa* specifically for treating *Arsha* or hemorrhoid's (SS.Ci.6.18).

3. **Leaves -** In the classical Ayurvedic text Ashtanga Hridaya, the topical application of *Bhallataka* leaf juice is specifically indicated for the management of alopecia (AH.U.24.30).
4. **Flowers (*Bhallataka Pushpa*) -** Charak Samhita identifies the *Bhallataka* flower as an etiological factor for *Agantuja Shotha* (oedema/inflammation due to external causes) (CS.Su.18.4), the Sushrut Samhita highlights its therapeutic utility as a key component of *Bhallatakadi Anjana* for the management of poisoning (SS.Ka.1.71). *Hirdyadeepak Nighantu* classified *Bhallataka Kusum* in *Pittaghan Varga,* which indicates its *Sheet Virya* (pg. no. 25).[25]
5. **Root** - The root of *Bhallataka* is a vital component of the *Kapithyaadi Dravya Parisheka*, a therapy to treat *Sheetaputna*, a paediatric disorder characterised by systemic toxicity and skin involvement (SS.U.34.3). *Kalyanak Lavana* (*Bhallataka Mula, Shakha, Patra*) should be incorporated into the beverages and meals of patients suffering from *Vata* disorders, *Gulma*, *Pleeharoga*, and *Agnimandya* (SS.Ci.4.32).

- In ethnomedicinal practices, *S. anacardium* root decoction is consumed orally once a day, usually in the morning, for a period of two to four weeks in the patients of cancer (NIC-21). Despite its cultural significance, there is no scientific validation of its anticancer efficacy, and internal use is generally discouraged in pregnant women, children, and individuals with serious health conditions.[26]

Table 5: *Rasayana* Formulations and Their Uses

S.No	Formulations	Out Come
1.	*Bhallataka Ksheer* (*Vardhman Bhallataka Rasayan* – (use of 1000 nuts, starting with 10 nuts, increase 1 nut per day up to 30 nuts and then reduced to 10 nuts) – Marking nut cooked in milk.	Rationalized use of *Bhallataka* quickly pacifies all diseases caused by *Kapha*, all types of obstructions (*Vibandha*), improves *Medha* (intellect) and digestive power (*Jatharagni*), prevents aging process, gives longevity 100 years, rejuvenator, alleviates *Sosha* (cachexia), enhances beauty (CS.Ci.1-2.13,14,16; AH.U.39.80,151; SS.Ci.27.7,8; SS.U.41.48;)
2.	*Bhallataka Kshaudra*	
3.	*Bhallataka Taila*	
4.	*Bhallataka Sarpi*	
5.	*Gud-Bhallataka*	
6.	*Bhallataka Yusha*	
7.	*Bhallataka Palal*	
8.	*Bhallataka Saktu*	
9.	*Bhallataka Lavana*	
10.	*Bhallataka Tarpana*	
11.	*Bhallataka Amalaka Shukti* (AH.U.39.80)	

Table 6: Compounded formulations of *Bhallataka* with their Indications

S.No.	Compounded Formulations	Disease Indications
1.	*Bhallataka Ghrit*	Abdominal lump caused by *Kapha Dosha*, anaemia, splenomegaly, dyspnea, IBS, cough (CS.Ci.5.143,146), (AH.Ci.14.80)
2.	*Bhallataka Kshara, Hinguaadi Kshara*	Heart diseases, anemia, IBS, abdominal lumps, abdominal pain. (CS.Ci.15.177) & BPH, Hemorrhoids, and splenomegaly (AH.Ci.15.70)
3.	*Bhallataka Rasayana*	Semen contaminated by *Kapha.* (CS.Ci.30.150), leprosy, increases digestive fire, promotes intelligence, hemorrhoids, urinary disorders. (AH.U.39.66-79)
4.	*Bhallataka Sattu*	Glandular erysipelas (CS.Ci.21.130), hemorrhoids (SS.Ci.6.1)
5.	*Bhallataka, Trikatu, Arka, Kusth, Sarshapa,* etc*. Lepa, Bhallatakadi Lepa*	Leukoderma (SS.Ci.9.27), leukoderma, leprosy, hemorrhoids (AH.Ci.20.16)
6.	*Bhallatakadi Taila*	Sinus, indigestion, minor illness (SS.Ci.17.41 & SS.Ci.20.54)
7.	*Elaadi Sarpi Guda*	Promotes intelligence, anaemia stimulates the digestive fire, abdominal lumps, fatigue, fistula-in-ano. (AH.Ci.5.29)
8.	*Eladi Ghrit*	*Rajyaskshma*, *Kash*, *Hridyaroga*, *Gulma* (abdominal lump), *Grahni* (IBS). (SS.U.41.52)
9.	*Gandiradhyarishta*	Oedema, fistula-in-ano, urinary disorders, leprosy, hiccough. (CS.Ci.12.29)
10.	*Madhukasava*	IBS, leprosy, and urinary disorders stimulate the digestive fire. (CS.Ci.15.146; AH.Ci.10.47)
11.	*Mustaadi Gana & Nyogrodhi Gana*	Vaginal diseases, *Stanya Shodhana* (breastmilk purifier) (SS.Su.38.54; AH.Su.15.40) & dysentery, fracture healing, vaginal diseases. (SS.Su.38.48)
12.	*Dhuma* with powder of *Bhallataka, Kakubha, Guggul, Tejpatra, Sarshapa,* etc*.*	Anthelminthics / worm infestation) (CS.Ci.23.100)
13.	*Tarpana* with buttermilk and *Bhallataka, Arshnasaka Yoga*	*Arsha* (hemorrhoids) (CS.Ci.14.70; AH.Ci.8.162)
14.	*Chucchu Yuthikadi Shaka*	Bleeding disorders, dysentery (SS.Su.46.249)
15.	*Narikeladi Anjana*	*Sadhya Shukra Roga* (pterygium) (AH.U.11.53)
16.	*Shidhartakadi Dhoopana*	*Graha Rog - Negmesha (*SS.U.36.7*)*
17.	*Agruadi Taila*	*Jawar* - Fever with chills (CS.Ci.3.266)
18.	*Putiyadi Dhoop*	*Sarvagraha Vimokshan treatment* (AH.U.3.47)
19.	*Bhallataka, Vacha, Vyosha Kashaya, Pippliyadi Gana Kawath*	Thirst due to *Ama. (*CS.Ci.22.47 & SS.U.48.29*)*
20.	*Trikantakadhya Sneha, Bhallatakasava, Arista, Asyaskrati, Leha, Asava, Sneha Proyaga*	Urinary disorders (diabetes mellitus) due to *Kapha-Pitta*, anaemia. (CS.Ci.6.38,45), urinary disorders. (SS.Ci.11.10; AH.Ci.12.18)
21.	*Mulakadya Taila*	*Vata* - Diseases *(*CS.Ci.26.168*)*
22.	*Pathya* food, *Kanakakshiri Taila, Shaalsaradigana Sadhit Manth, Vidangadi Pindi*	*Kushtha-Mandal* (leprosy/disease of skin), itching (CS.Ci.7.82,113; SS.Ci.10.4; AH.Ci.19.13,45)
23.	*Dhanvanter Ghrit, Bhallataka Vidhana*	*Madhumeha* - Carbuncles & diabetes mellitus (SS.Ci.12.5; SS.Ci.13.14)
24.	*Sursadi Sadhit Taila*	*Medovriddhi, Vrana* (AH.Ci.13.38)

Collection of *Bhallataka* for *Rasayana Prayog*

The fruits of the marking nut indicated for therapeutic utilization should not be damaged (*Anupahata*), should be free from disease (*Anamaya*), meaning they are not infested with insects or otherwise deformed, fully ripe (*Paripakva*), containing their full taste (*Poorna Rasa*), size (*Poorna Pramana*), and potency (*Poorna Virya*), black in colour, like ripe *Jambu* fruit (*Pakwa Jambu Phala*). Such marking nuts collected in the months of *Shuci* (*Jyeshtha* (May-June)) or in *Sukra* (*Aashaadha* (June-July)). After collection, fruits are placed in *Yava*/*Masha Dhanya Rashi* (heap of barley or black gram) for four months. These fruits are taken out in months of *Saha*-*Sahasya* (*Agrahayana* - *Pausha*), and after preparing the body with *Sheet* (cooling), *Snigdha* (unctuous), and *Madhur* (sweet) substances, their use should be commenced (CS.Ci.1-2.13).[2]

Quality (*Grahya Lakshana*) of *Bhallataka* for Medicinal Use

For medicinal preparations, ripe marking nuts that sink in water are said to be fit for medicinal use after purification. Fruits that do not sink should be considered unsuitable for medicinal purposes.[27]

Adverse effects of use of Non-Purified Fruits of *Bhallataka*

If even a very small amount of the juice of the marking nut comes into contact with any part of the body, it causes severe burning and ulcers. If it comes into contact with the mouth, it causes intense burning, swelling, and erysipelas. Therefore, physicians should purify marking nuts with great caution to avoid these complications. Before adding the marking nut to the brick dust, the caps of the fruits should be cut off with a knife, and coconut oil should be applied liberally to the hands before rubbing.[27]

Traditional Methods of Purification

1. Purification with brick powder: *Bhallataka* fruits are filled in a strong cloth bag or pouch and finely powdered brick dust, rubbed with moderate pressure with hands. When the brick dust becomes saturated with the oil of fruits, that is, when the outer skin of the fruits comes off, wash them thoroughly in hot water. [14,27]

2. Purification with coconut water: *Bhallataka* fruits are cut into two pieces, placed in a *Dola Yantra* (a type of steam distillation apparatus) filled with coconut water, and boiled for one to two hours. [27]

3. Purification with *Gomutra* and cow milk: *Bhallataka* fruits after removing the attachment of thalamus are soaked in *Gomutra* for seven days and thereafter in *Godugdha* for seven days. The seeds are then put into a bag containing coarse brick powder with which they are rubbed carefully, with a view to reducing the oil content. Then the fruits are washed with water and dried in air.[28]

4. Purification with frying: The traditional purification method, i.e., frying the *Bhallataka* fruit, is followed traditionally in the southern parts of India.[29]

Impact of *Shodhana* (Purification) on *Bhallataka*

Bhallataka contains urushiols and anacardic acids, that cause severe skin blistering and contact dermatitis. To make it safe for therapeutic use in human beings, classical texts of Ayurveda have traditional purification processes (*Shodhana*) for *Bhallataka.* Research shows that this process triggers decarboxylation, successfully converting the toxic anacardic acid into the significantly less harmful compound known as anacardol.

Chemical analysis using HPTLC confirms these changes, showing a reduction in chemical spots and an increase in anacardol levels in the purified samples. The purification also results in a higher ash value due to brick powder residue and a decrease in methanol-soluble extractives, indicating a loss of corrosive oils. Ultimately, these biochemical transformations ensure that the drug's toxicity is neutralized while its therapeutic potential is preserved for clinical application.[29]

The result indicated that purification of *Bhallataka* imparted chemical changes to certain active compounds and enhanced its anti-cancer activity when compared to raw sample. The study claimed that traditional purification process can impact the chemical and pharmacological profile of herbal drugs and thus beneficial in increasing their safety and efficacy.[30]

Contraindications of *Bhallataka* Therapy: Children, pregnant women, elderly persons, and individuals with a *Pitta*-dominant constitution should not be administered *Bhallataka*.[31]

Dietary Guidelines (*Pathya*) during *Bhallataka* Therapy: Substances that pacify *Pitta* such as milk, *Ghrita*, *Sharkara*, and rice is beneficial. The consumption of sesame and coconut is also highly recommended.

Conversely, while consuming *Bhallataka*, one must strictly avoid substances that aggravate *Pitta*, specifically those possessing heating potency (*Ushna Virya*) or having pungent, sour, or salty tastes. One should also refrain from sitting near a fire or in direct sunlight. The "*Kakarashtaka*" (a group of eight specific dietary substances viz.- *Kalinga*, *Karvellaka*, *Kadli*, *Kakamachi*, *Kusumbha*, *Kakarkoti*, *Kushmanda* and *Karkati*) should not be consumed during the period of consumption of *Bhallataka*. [31]

Management of Adverse Effects of *Bhallataka* Therapy: Symptoms of adverse effect of *Bhallataka* include itching or burning sensation in anal region and tip of penis, excessive sweating and thirst, oligourea, discoloration of urine to smoky or red. On appearance

of these symptoms, either reduce the dosage or discontinue the use of *Bhallataka* entirely, and immediately commence the liberal intake of substances that counteract and pacify the aggravated *Pitta Dosha* like milk, *Ghrit, Sharkara*, coconut water etc. The skin may develop itching, a burning sensation, or, occasionally, swelling. In such instances, sesame oil, coconut oil, ghee, or a resin-based ointment should be applied to the affected area; this helps to alleviate these adverse symptoms within 3 to 4 days. [31]

Botanical Specifications of *Bhallataka*

Bhallataka consists of the mature fruits of *Semecarpus anacardium* Linn. (Fam. Anacardiaceae), a medium-sized tree found in moist deciduous forests all over the country.[32]

Morphology

Moderate-sized, deciduous trees reaching a height of 12m, with dark coloured bark. Young parts and inflorescence are softly grey tomentose. Leaves oblong or obovate-oblong, rounded at the apex, cuneate at the base, entire, coriaceous, hispid pubescent beneath. Flowers greenish-yellow, polygamous, subsessile, in fascicles arranged on terminal panicles. Fruit a drupe seated on a cup like fleshy receptacle. Fruits borne in clusters, resembles the cashew but is much smaller. The fruit is of the size and shape of a broad bean, black in color, and quite hard and dry externally, but upon breaking the outer skin with a knife, the central cellular portion of the pericarp is full of a brown oily acrid juice; inside the pericarp is a thin shell conforming to it, and containing a large flat kernel, which has no acrid properties.

Flowers: April-May; **Fruits**: November-December. In forested area near Pilibhit it is found frequently in the *Sal* Forest. [33]

Distribution

It is a moderate-sized deciduous tree found in the outer Himalayas and hotter parts of India up to 3,500 ft in height. The plant is found in abundance in Assam, Bihar, Bengal, Odisha, Chittagong, Central India, and the western peninsula of East Archipelago, Northern Australia.[34]

Vernacular Name [32]

Arabic: Haber al fahun, Habb al qalb, Assamese: Bhelaguti, Bengali: Bhela (bhela), Bhelatuki, Danish: Ostindisk elefantlus, Dutch: Malakkanoot, Oostindische acajounnot, Oost-Indische olifantsluis, French: Anacarde d'Orient, Noix a marquer, Noix des marais, Greek: Semekarpos anakandion, Gujarati: Bhilamu, Kannada: *Bhallataka* , Bhallika, Goddugeru, Karigeri, Italian: Anacardio orientale, Japanese: Anakarudiumu orientaare, Makingunatto, Makingunattsu, Malayalam: Alakkuceru (alakkuceru), Chera, Marathi: Bibba, Bibha, Nepalese: Kaag bhalaayo, Oriya: Bhollataki, Portuguese: Anacardio oriental, Punjabi: Bhilawa, Russian: Semekarpus Anakardii, Spanish: Anacardio oriental, Tamil: Erimugi (erimuki), Teluga: Nallajeedi

Evidences of Therapeutic Potential from Contemporary Researches

Nutraceutical Potential of Seed Kernel

Kernel oil composition: Seed kernel can serve as a substitute for other oil seeds due to high protein and fat content. It contains 20-25% reddish-brown semidrying oil with a pleasant taste (Wealth of India, 1999). Seed oil is typically mixed with food items and, for topical purposes, applied in minimal quantities or mixed with other non-toxic oils (Shastri et al., 2002; Dwivedi et al., 2018) [116, 24]. Major fatty acids include linoleic, palmitic, and oleic acids, along with phytosterols (β-sitosterol, campesterol, stigmasterol) and tocopherol (δ-tocopherol, β-tocopherol). The oleic acid present in the kernel makes it good source of salad oil. [35]

Table 7: Nutritive Value of the Marking Nut Kernel [35]

Proximate Principles (g/100g)	Minerals and Vitamins (mg/100g)	Essential Amino acids (mg/g protein)
Moisture: 3.8	Iron: 6.1	Arginine: 9.6
Protein: 26.4	Phosphorus: 836-886	Histidine: 1.8
Fat: 36.4	Calcium: 295	Lysine: 4.1
Fiber: 1.4	Thiamine: 0.38	Leucine: 7.3
Minerals: 3.6	Riboflavin: 0.15-0.17	Isoleucine: 4.4
Carbohydrate: 28.4	Nicotinic acid: 1.06-2.74	Methionine: 1.5
Calories (kcal): 5.87	-	Threonine: 2.1
		Phenylalanine: 2.5
		Valine: 4.7
		Tryptophan: 1.1

Table 8: Fatty Acid Composition of Marking Nut Kernel [35]

Fatty Acid Composition	Quantity
Palmitic Acid	16%
Stearic Acid	3.8%
Oleic Acid	60.6%
Linoleic Acid	17.1%
Anacardic acid	1.4%

Nutritive Value of the Edible Hypothalamus of Marking Nut

The fleshy, orange cup of the fruit can be consumed when ripe, although it is significantly astringent. The roasted fruit rinds are commonly eaten by local people. Additionally, it can be stored in a dried form for 4-8 months. *S. anacardium* demonstrates a high nutritional value, supporting its role in traditional diets and its potential in modern nutritional applications. Its rich composition of macronutrients, vitamins, minerals, and bioactive compounds underscores its importance both as a dietary staple and a medicinal resource.[35]

Table 9: Nutraceutical Potential of *S. anacardium* Hypothalamus [36]

Nutritional Test Parameters	Quantity
Calorific Value	182.05 Kcal/100g
Total Carbohydrate	38.87 g/100g
Total Sugar	2.51 g/100g
Total Protein	5.63 g/100g
Moisture	54.03 g/100g
Total Ash	1.02 g/100g
Crude Fiber	3.62 g/100g
Total Fat	0.45 g/100g
Sodium	36.66 mg/Kg
Potassium	1058.82 mg/Kg
Iron	8.34 mg/Kg
Zinc	5.97 mg/Kg
Magnesium	149.51 mg/Kg
Copper	6.5 mg/Kg
Moisture content (%) [35]	83.6±16.3
Vitamin B1(mg/g) [35]	0.0024±0.0003
Vitamin C (mg/g) [35]	0.35±0.02
Crude protein (mg/g) [35]	32.20±1.11
Total sugar (mg/g) [35]	147.30±1.25
Total lipid (mg/g) [35]	0.016±0.003

Biological activities reported

Mature fruit / NUT

Antioxidant and Anticarcinogenic Activity

Antioxidant action was monitored by the activities of antioxidant enzymes viz. catalase, superoxide dismutase and glutathione transferase. The effect of *S. anacardium* was also studied by observing the activity of LDH (lactate dehydrogenase), an enzyme of anaerobic metabolism. LDH activity serves as a tumor marker. The activities of antioxidant enzymes decreased gradually as lymphoma developed in the mouse. However, LDH activity increased progressively. Administration of the aqueous extract of *S. anacardium* to lymphoma-transplanted mice led to an increase in the activities of antioxidant enzymes, whereas LDH activity decreased significantly, indicating a decrease in carcinogenesis. The aqueous extract was found to be more effective than doxorubicin, a classical anticarcinogenic drug, with respect to its action on

antioxidant enzymes and LDH in the liver of mice with developing lymphomas.[37]

Mathivadhani and colleagues investigated the usage of *S. anacardium* nut extract to suppress the T47D human breast cancer cell line. These alterations were accompanied at the molecular level by an increase in Bax, cytochrome c, caspases, and Bcl (2) and a decrease in PARP cleavage, followed by the fragmentation of inter-nucleosomal DNA.[38]

CNS Activity

Farooq *et al.* evaluated the beneficial effect of nuts of SA, extracted with milk, on the CNS, mainly for its locomotor and nootropic activities in different experimental animal models. Slight CNS depressant effect was noted with 150mg/kg of the extract, and it was found to possess nootropic activity.[39]

Antiatherogenic effect

The imbalance between the pro-oxidants and antioxidants is the main cause of the development of atherosclerosis. To prevent such a condition, antioxidant therapy is beneficial. *S. anacardium* (SA) shows antioxidant properties. It has the capacity to scavenge the superoxide and hydroxyl radicals at low concentrations. The process of atherogenesis initiated by peroxidation of lipids in low-density lipoproteins was also found to be inhibited by SA. It reduces the tissue and serum hyperlipidaemia by the inhibition of intestinal cholesterol absorption supplemented with peripheral disposal, thus possessing anti-atherosclerotic activity.[40]

Immunomodulatory and anti-inflammatory effect

S. anacardium nut milk extract (SA) effectively restores humoral and cell-mediated immune responses to near-normal levels in arthritic models. It demonstrated powerful anti-inflammatory, analgesic, and antipyretic properties by significantly reducing paw oedema and key inflammatory markers like TNF-α, nitric oxide, and myeloperoxidase. Results indicate that SA is a potent immunomodulatory and anti-inflammatory agent with efficacy comparable to conventional treatments like indomethacin.[41]

Hypoglycaemic effect

The ethanolic extract of dried nuts of SA (100 mg/kg) evaluated in both normal (hypoglycemic) and streptozotocin-induced (antihyperglycemic) rats decreased the normal rats' plasma glucose levels. (J Ayu Int Med Sci 2025; 10 (2) 207 Komal JP et al.). Hypoglycemic action of *Bhallataka* on blood glucose levels at 0-, 1-, 2-, and 3-hours of administration was assessed, and the antihyperglycemic effect of SA was contrasted with that of tolbutamide, a sulfonyl urea derivative used to treat diabetes mellitus. [38]

Antimicrobial Activity

The petroleum ether extract (PEE) and aqueous extract fractions (AQE) of SA nuts showed inhibitory activity against Staphylococcus aureus (10 mm) and Shigella flexneri (16 mm) at 100 mg/ml, respectively while chloroform extract showed inhibition of Bacillus licheniformis, Vibrio cholerae and Pseudomonas aeruginosa. The ethanol extract showed inhibition of Pseudomonas aeruginosa and S. aureus. The oils extracted from nuts did not exhibit any antimicrobial activity. Alkaloids, tannins, saponins, flavonoids, anthraquinone and volatile oils were detected in the aqueous extracts, with only triperpenoid in PEE and steroid in both PEE and chloroform extracts. The phytochemicals such as alkaloids, flavonoids, tannin and anthraquinone were present in oils extracted from nuts. The antibacterial activity of the nut extracts of *Semicarpus anacardium* has been claimed due to AQE and PEE-extractable compounds.[42]

Stem Bark

Antidiabetic and antioxidant activities

The bark extract exhibited significant ($p<0.05$) anti-diabetic activity with lowering TC, TG, LDL level dose-dependently and protected liver which may be partially explained by attenuation of SGOT and SGPT levels and increased liver glycogen. The percentage of Hb and RBC counts were negatively correlated with the doses of extracts. In DPPH scavenging assay, IC_{50} values of SA extract and ascorbic acid were found 72.24µg/ml and 17.81µg/ml, respectively. Phytochemical screening showed the presence of steroids, triterpenoids, flavonoids, glycosides, saponins, and tannins which contribute to biological activity. These results indicated that stem barks of *S. anacardium* possess strong anti-diabetic and antioxidant potentials. [43]

Cytoprotective and anti-inflammatory

The methanolic extract of *S. anacardium* stem bark was evaluated for antioxidant, cytoprotective and anti-inflammatory potentials. The methanolic extract exhibited significant DPPH, superoxide and hydroxyl radical scavenging activities. In addition, the methanolic extract also exhibited significant nitric oxide scavenging ability. The extract showed significant protection against Fenton reaction induced lipid peroxidation in sheep liver tissue homogenate model, heat induced hemolysis in human RBC membrane model, inhibition of heat induced protein denaturation and proteinase inhibitory activity. From these results, it is concluded that the methanolic extract of *S. anacardium* stem bark, exhibits high antioxidant, free radical scavenging activities. It also exhibited significant cytoprotective and anti-inflammatory activities comparable to standards.[44]

Oil

Efficacy in Lung cancer

Metabolomics combined with network pharmacology detected 2023 unique metabolites at the MS1 level and 216 metabolites at the MS2 level.

Bhallataka Taila metabolites were found to interact with 180 human target proteins identified through Binding DB analysis. These target proteins were mapped to key cancer regulatory signaling pathways, along with TNF-related apoptosis-inducing ligand (TRAIL), protease-activated receptor-1 (PAR1)-mediated thrombin signaling, Syndecan-1 and Glypican pathways, and vascular endothelial growth factor receptor (VEGFR)1/2 pathways. In vitro validation demonstrated that *Bhallataka Taila* significantly regulated apoptosis (57%) and ROS production (56%) in A549 cells compared to control while modulating other cancer-related regulatory pathways. The study examined the metabolite profile and mode of action of *Bhallataka Taila* in lung cancer cells. It was observed that the modulation of the ERK1/2- HIF-1α-p53 signaling axis plays a pivotal role in its anticancer effects. These findings suggest that *Bhallataka Taila* is a promising therapeutic agent in both in vitro and preclinical models of lung cancer and other cancers.[45]

Leaf Extract

Activities Against Breast Cancer

The ethyl acetate leaf extract selectively affects cancer cells in a dose-dependent manner (IC_{50}: 0.57µg/ml in MCF-7 cells) in various cancer cell lines and induces apoptosis in cancer cells. However, the non-malignant cells were relatively insensitive to the extract. Incubation of the leaf extract induces cell cycle arrest and suppresses cancer cell migration in the cell culture model. Moreover, oral administration of extract significantly restored tumor growth in mice. These observations suggest the anti-cancer activities of *S. anacardium* leaf potential for both *in vitro* and *in vivo* models.[46]

DISCUSSION

Pharmacological properties of *Bhallataka* were well understood by the ancient Sages of Ayurveda. They were well versed with properties of different plant parts like inflorescence, leaves, stem bark, receptacle of the fruit, seed cover, seed kernel and oil. They also knew sharpness, irritant and corrosive nature of fruit sap.

Judicious and rationalized use of *Bhallataka*, as a single drug and in the preparation of a lot number of therapeutic formulations, unveils, expertise wisdom of ancient Sages. In pharmacological screening and purification of deleterious drug like *Bhallataka.* Scientific approach of Sages of Ayurveda in the process of purification of *Bhallataka* has been validated by Chemical analysis using HPTLC which confirms conversion of toxic anacardic acid into less harmful substance anacardol. Ancient scholars of Ayurveda have described nutritive potential of seed kernel of marking nut, which has been sustained by nutraceuticals analysis of seed Kernel.

Acharya Charaka, in context of *Bhallataka Rasayana* has described proprieties of *Bhallataka* stating that, it is sharp like fire but hypothalamus of the fruit is sweet in taste and cooling in potency. This description indicates nutraceuticals potential of hypothalamus. This fact has been revalidated by nutraceutical analysis of hypothalamus. (Table No. 9)

Acharya Charaka has considered *Bhallataka*, as *Amrit* (nectar) with the condition of judicious use according to guidelines. He further claims that, *Bhallataka* is capable of alleviating all types of disorders produced by *Kapha* and obstructive pathologies. It promotes intellect and ignites all types of digestive fire.

Digestive power may be co-related with the capacity & biological system to cope with oxidative stress caused by generation of free radicals. In biological screening studies mature nut has exhibited antioxidant activity, anticarcinogenic potential, CNS activity, antiatherogenic effect**,** immunomodulatory and anti-inflammatory effect, hypoglycemic effect and antimicrobial activity. All these activities are evidences for the ancient wisdom of sedges of Ayurveda.

Acharya Sushruta has used root bark of *Bhallataka* in the preparation of *Kapithyaadi Dravya Parisheka* indicated in *Sheetputna* and as a constituent of *Kalyanak Lavan* indicated for the treatment of diseases of *Vata, Gulm, Pliharoga* and *Agnimandhya*. No studies are available on biological activity of root bark, rather stem bark, has been found to exhibit antioxidant potential, antidiabetic activity, cytoprotective activity which again substantiates therapeutic use of root bark in ancient medical system.

As mentioned earlier, *Bhallataka Taia* has been described as a *Rasayana* by Acharya Charaka and has been indicated in the management of large number of diseases Conditions. A metabolomic study combined with network pharmacological study has given leads towards efficacy of *Bhallataka Taila* in the treatment of lung cancer.

In classical texts, therapeutic use of leaves in alopecia and flower in the management of some other disease has also been described. The biological activity of ethyl acetate extract of leaves against Breast cancer cells in vitro and in vivo models establishes the need of further, investigations towards therapeutic Potential of *Bhallataka* leaves and flowers.

CONCLUSION

Bhallataka has been a potential medicinal plant in ancient Ayurvedic practices. In contemporary Ayurvedic practices, use of *Bhallataka* has been limited with only a few therapeutic formulations available in the market. *Bhallataka* is a plant which is abundantly available almost throughout India, it has established identity of its botanical source, almost every plant part has been described to be used for therapeutic purposes

is ancient Ayurveda and the claims have been evidenced in modem screening studies. Therefore, there is a need of further studies regarding clinical efficacy of different parts of the plant.

Abbreviations Used

AH. – Astanga Hridaya, A. Ni. – Astang Nighantu, AS. - Aştanga Sangraha, BP. Ni. - Bhavprakash Nighantu, Ci. - Cikitsasthana, CS.- Charak Samhita, D. Ni. - Dhanvantari Nighantu, K. Ni. - Kaiyadev Nighantu, Ka – Kalpasthana, Ma. Ni. – Madnadi Nighantu, MP.Ni. - Madanpal Nighantu, Ni. - Nidanasthana, Ni. Ad. - Nighantu Adarśa, Ni. S.- Nighantu Shesha, P. R. – Paryayaratnamala, R.Ni. - Raj Nighantu, Sa. – Sharir sthana, SA – Semecarpus anacardium, Sh.Ni. - Saligrama Nighantu, Sí. - Siddhi Sthana, So. Ni. – Shodal Nighantu, Sr. Ni. – Saraswati Nighantu, SS. - Sushruta Samhita, Su. - Sutra Sthan, U. - Uttar Sthana/ Uttar Tantra, Vi. – Vimanasthana.

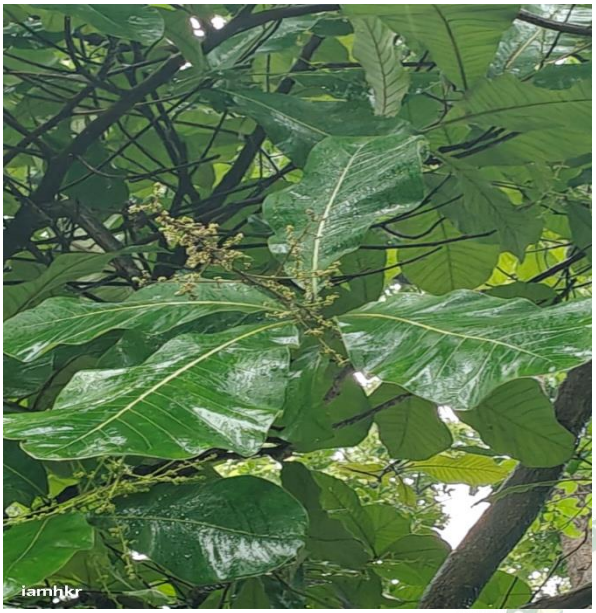

Photo 1: Inflorescence of *S. anacardium*

Photo 2: Unripe nuts of *S. anacardium*

Photo 3: Semi ripe fruit of *S. anacardium*

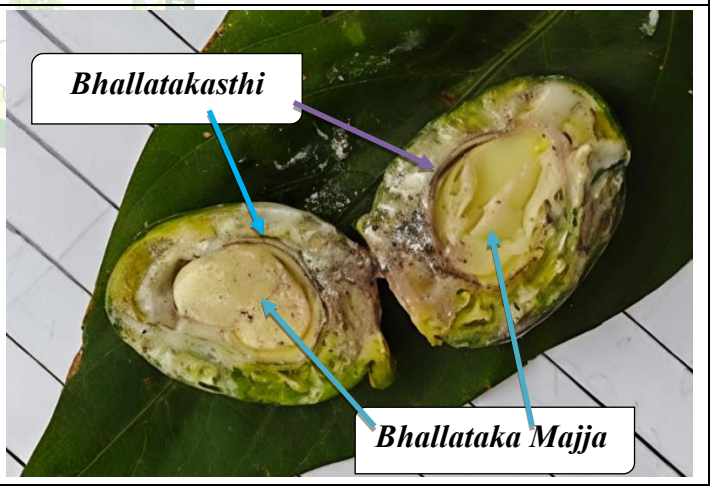

Photo 4: T.S. of *S. anacardium* fresh fruit

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