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Diachronic Perspective of Punnaga (Calophyllum inophyllum Linn.) with Emphasis on its Distinct Identity: A Narrative Review

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ABSTRACT: Punnaga (*Calophyllum inophyllum* Linn.) known as Alexandrian Laurel is a significant medicinal plant in traditional system of medicine (Ayurveda). It is utilized in various therapeutic applications such as Skin disorders, Treatment of poisoning and Wound healing etc. It has been observed that deficient taxonomical clarity, gaps in knowledge, regional diversity, Punnaga's identity remains debated in Ayurveda, resulting substitution and adulteration of drug. The review aims to critically analyze references of Punnaga from Ayurvedic classical text to contemporary scientific studies, focusing on its therapeutic claims and the controversies surrounding its botanical identity. The study involved a comprehensive review of Ayurvedic texts, commentaries and modern pharmacological literature. Keywords such as Tung, Nagkeshar, Punnagkeshar etc. used to trace its individuality and explore sources of controversy. The review revealed ambiguity in the identity of punnaga, as classical sources and regional traditions associate it with different species. Such uncertainty leads to adulteration and substitution, complicating its medicinal use. Due to ambiguity in its identification, Punnaga's therapeutic role remains unclear. Bridging traditional texts with modern research is essential to establish its medicinal significance.

INTRODUCTION

In traditional medicine, accurate identification of medicinal drugs is fundamental for assuring efficacy, safety, and standardization. In Ayurvedic medicinal plants, controversies rising from regional substitutions, overlying nomenclature and interpretative diversity across classical texts. Which have created significant challenges for drug quality and therapeutic consistency (1). Such ambiguity mostly occurs among the plants stated in ayurvedic text but which belongs to multiple botanical species in practices. The importance of correct plant identity is essential for patient safety, therapeutic efficacy, and scientific validity.

Misidentification or indiscriminate substitution of plant species raise controversy to compromises efficacy, safety, and pharmacological validity (2). Controversial drugs (*Sandigdha Dravyas*) in Ayurveda with ambiguous botanical identity, usually described with nomenclature based on morphology features, ecological distribution, or Clinical usage (3).

Punnaga is an important Ayurvedic medicinal plant botanically identified as *Calophyllum inophyllum* Linn., belonging to the family Clusiaceae, and it is native to the coastal regions (4). Ayurvedic compendia highlighting its role in medicinal attributes. Traditionally, its seed oil has been widely used in the management of wounds and skin disorders, while leaves decoction and stem resin have been used in the treatment of ulcers and eye-related conditions (5). In addition, *Punnaga* occupies a significant place in folklore, where trees were revered as sacred relics (6), and in literary traditions it is portrayed as the blossom that emerged at the site of *Siva's* presence (7), thereby underscoring its distinct identity within Indian heritage.

Though *Calophyllum inophyllum* Linn. has been widely studied for its pharmacological properties, existing reviews rarely include its Ayurvedic identity as described in classical texts. In Primary Samhita sources, *Punnaga's* (*Calophyllum inophyllum* Linn.) identity remains debated in Ayurveda. The principal source of this ambiguity has been associated with drug *Nagkeshar* (*Mesua ferrea* Linn.), that later authors and traders have variably linked to *Mesua ferrea* Linn., *Orbocarpus longifolius*, *Calophyllum inophyllum* Linn., *Cinnamomum tamala*, and *Dillenia pentagyna* (8). Such diversity reflects the influence of regional usage, substitution practices, and overlapping nomenclature. The present review advances the literature by tracing *Punnaga* from classical ayurvedic sources to contemporary scientific perspectives, thereby establishing its distinct identity and providing a structured framework for integrative scholarship.

This study aims to critically synthesize Ayurvedic references of *Punnaga* (*Calophyllum inophyllum* Linn.), analyzing textual and conceptual ambiguities underlying its identity debate. The Purpose of this review is to compile and interpret various references of *Punnaga* from Classical medical compendia. Additionally, it correlates classical Ayurvedic attributes with Contemporary botanical investigations, phytoconstituent analyses, and pharmacological findings, to establish the distinct identity of *Punnaga*.

MATERIALS AND METHODOLOGY

All authoritative Ayurvedic canons were systematically reviewed, including the *Vedas*, *Puranas*, *Sambitas* (texts of the *Brhatrayi* and *Laghutrayi*), treatises from the *Sambita* period (Classical text) and *Nighantus* (Materia medica). References to *Punnaga* and its synonyms (*paryaya*) such as *Tunga*, *Nameru*, *Kesar*, *Raktakesar*, and *Surpunnaga*, were traced using Boolean operators like *Punnaga* and *Nagkeshar*, *Punnaga* not *Nagkeshar*, *Punnaga* or *Tunga*, *Punnaga* and *Kesar*, *Punnaga* and *Surangi* etc. to define as an independent entity and resolve the prevailing controversy. Standard textbooks of *Dravyaguna* and authoritative commentaries were examined for additional insights. During the review, critical parameters were considered, including synonymy, *Rasapanchaka* (attributes), morphological descriptions and references in *Cikitsa Granthas* (Ayurvedic compendium) to assess drug independency. Special emphasis was placed on passages where both *Punnaga* and *Nagkeshar* were mentioned either as substitutes or as independent drugs, in order to clarify textual ambiguity and practical usage. A conceptual model was referred from previous studies to resolve the identity controversy (2). [Figure 1] The model outlines a stepwise approach, begin with textual and practitioner base information, followed by regional literature review, correlation with modern botanical data, examination of market materials, primary pharmacognostic examination and lastly validation of its therapeutic uses. The Contemporary medicinal sources with botanical monographs, regional floras, peer-reviewed scientific journals, and digitized knowledge platforms such as PubMed and the AYUSH portal were included for review to confirm ancient data and contextualize within current pharmacognostic frameworks. The article from non-indexed journal and other than English language are excluded.

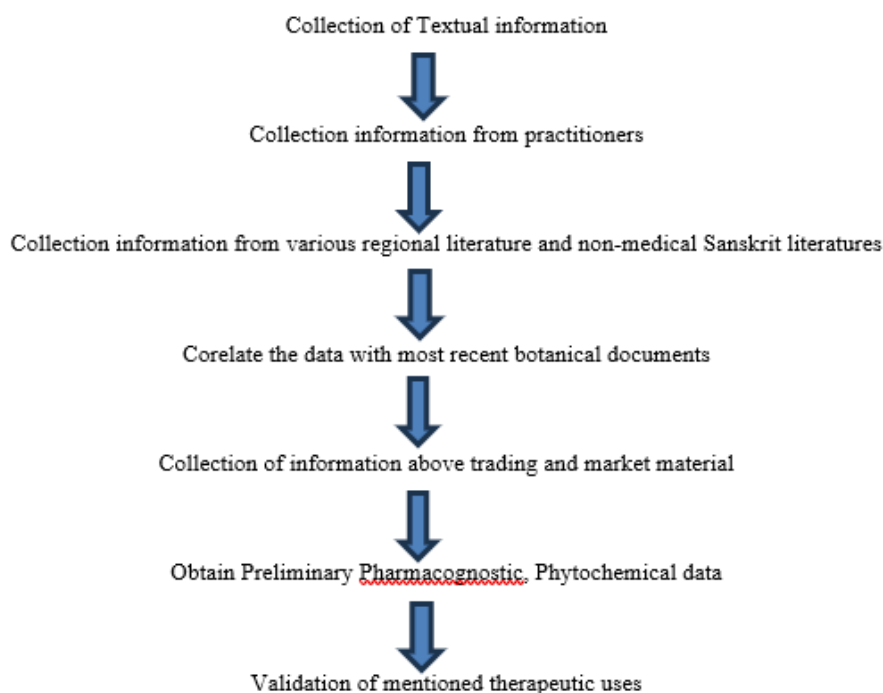


Figure 1: Flow diagram for resolving controversy in plant material in ayurveda

Figure 1 shows steps for resolving the controversy in plant material identification.

OBSERVATIONS

Historical perspective of *Punnaga* (*Calophyllum inophyllum* Linn.)

Historical study understands Morphological architecture, Evolutionary ancestry, and Curative potential of that drug. Tradition safeguarded through the ages shows the need for a clear understanding of each drug, particularly where overlapping identities obscured the true identity of drug such as *punnaga*. In *Vedic* period [2500- 300 BC] *Punnaga* finds no citation. But it definitely seems to be known in “*Shiva Puran*” (9) and “*Devi Bhagvata Puran*” (10) by the name *Punnaga*.

Table 1: Classification of *Punnaga* according to Canonical Sources as follow:

Classical Text	Gana/Varga
<i>Sushrut Samhita</i> (11)	<i>Eladi Gana, Priyangvadi Gana</i>
<i>Ashtang Sangraha</i> (12)	<i>Eladi Gana, Priyangvadi Gana</i>
<i>Ashtang Hrudya</i> (13)	<i>Eladi Gana, Priyangvadi Gana, Varnya Gana</i>
<i>Kaiyadev Nighantu</i> (14)	<i>Aushadi Varga, Drava Varga</i>
<i>Bhavprakash Nighantu</i> (15)	<i>Vari Varga</i>
<i>Madanapal Nighantu</i> (16)	<i>Karpuradi Varga</i>
<i>Madanadi Nighantu</i> (17)	<i>Saptavinsha Gana</i>
<i>Raja Nighantu</i> (18)	<i>Karveeradi Varga</i>
<i>Nighantu Adarsa</i> (19)	<i>Nagpushpadi Varga</i>
<i>Sarasvati Nighantu</i> (20)	<i>Mahavruksha Varga</i>
<i>Ashtang Nighantu</i> (21)	<i>Eladi Gana, Priyangvadi Gana</i>
<i>Sausrut Nighantu</i> (22)	<i>Eladi Gana, Priyangvadi Gana</i>
<i>Abhidanaratnamala</i> (23)	<i>Kashayadravyaskandha</i>

Table 1 shows the references of *Punnaga* as documented in different *Sambitas* and *Nighantus*, where it is classified under various Vargas and Ganas, reflecting its traditional categorization in Ayurvedic literature.

In Samhita Period [300BC-1300AD] *Punnaga* describe in various classification as follow:

Table 2: *Punnaga* in Ayurvedic classical text

Classical Text	Uses
<i>Sushrut Samhita</i> (1000 B.C – 2 A.D.)	<i>VatpittaKaphanashak</i> (Tridosha-balancing), <i>Varna Prasadan</i> (improving skin appearance), <i>Koth</i> (Urticaria) (24)
	<i>Pakvatisar</i> (chronic diarrhoeal condition), <i>Asthisandhan</i> (fracture healing), <i>Vranaropan</i> (wound healing) (25)
	Flowering in <i>Hemant rutu</i> (Late Autumn / Pre Winter) (26)
	<i>Ajeygbrut</i> for <i>Visba Nash</i> (Antidote poison -neutralizing action) (27)
	<i>Sarpsvishachikitsa</i> (Snake-bite management) (28)
	<i>Mahasugandhinamak Agad</i> (Potent antidote) (29)
	Used as <i>Dabashamanbhum</i> (help to soothe burning sensations) (30)
<i>Ashtang Sangraha</i> (6 th Century AD)	Flowering in <i>Hemant rutu</i> (Late Autumn / Pre Winter) (31)
	<i>Pittakapha shamak</i> (Pitta-Kapha balancing), <i>Rakta nashak</i> (blood detoxifier) (32)
	<i>Prayogikdhumpan</i> (Therapeutic smoke inhalation) (33)
	<i>Pakvatisar</i> (chronic diarrhoeal condition), <i>Asthisandhan</i> (fracture healing), <i>Vranaropan</i> (wound healing)
	Used in <i>VaatVikar</i> (Vata disorder), <i>KaphajVikar</i> (Kapha-related disorder), <i>Varna prasadan</i> (improving skin appearance), <i>Pidika</i> (Skin Papules), <i>Koth</i> (Urticaria) (34)
	<i>Sugandhi drug</i> (aromatic) (35)
	<i>Sarpavisha chikitsa</i> (Snake-bite management) (36)
<i>Ashtang Hruday</i> (7 th Century AD)	<i>Pakvatisar</i> (chronic diarrhoeal condition), <i>Asthisandhan</i> (fracture healing), <i>Vranaropan</i> (wound healing) (38)
	<i>VaatVikar</i> (Vaat disorders), <i>KaphajVikar</i> (Kapha disorders), <i>Varna</i> (Wound), <i>Pidika</i> (Skin Papules), <i>Koth</i> (Urticaria) (39)

In Table 2 it is observed that, *Charak Samhita* mentioned a *Tung*, but its identification varies between *Punnaga* and *Nagkeshar* creating confusion in its identification. *Sushruta Samhita* (40) and *Ashtang Sangraha* (41) identifies *Tunga* as *Punnaga* and therefore refers to *Tunga* for *Punnaga*. There is no any reference cited in *Kashyapa*, *Harit*, *Bhel* & *Sharangadhar Samhita*.

Commentators of *Charak Samhita*, *Sushrut Samhita*, *Ashtang Sangraha* and *Ashtang hruday*, it is observed that various names are used for drug *Punnaga* organized in the following table.

Table 3: Opinion of different commentators about *Punnaga*.

Name	Commentators						
	CK (42)	DA (43)	AR (44)	HE (45)	GA (46)	INDU (47)	GH (48)
<i>Tung</i>	+	+	+		+	+	+
<i>Varan</i>	+						
<i>Nagkeshar</i>		+					+
<i>Surapati</i> (<i>Surangi</i>)		+					
<i>Punnaga</i>		+	+	+			+
<i>Punnagakeshar</i>							+

(Abbreviations = CK- Chakrapani 11th Cen. AD, DA- Dalhana 12th Cen AD, AR- Arundatta 12th -13th Cen AD, HE-Hemadri 13th -14th Cen AD, GA- Gangadhar 19th Cen AD, Indu 9th-10th century AD, GH-Bhaskar Govind Ghanekar -1936)

Table 3 of Commentators show that variation in the nomenclature of *Punnaga*. Synonyms like *Tung* is used regularly in *Pradeha* (a thick medicinal paste applied externally to an affected area), while name like *Varan* is used for plantation in specific areas such as *Sthanbhumi* around *Sutikagar* (Maternity ward). In southern tradition the *Punnaga* is famous as *Surapati* (*Surangi*). *Punnaga* with *Nagkeshar*, adding historical ambiguity about its identity. Along with this the term *Punnagakeshar* is also used, shows how recognition progressed in Classical text. These variances highlight the challenge in confirming identity of *Punnaga*. Thus, Classical Ayurvedic texts distinctively describe *Punnaga* with specific nomenclature and therapeutic roles, distinguishing it from related species.

Therapeutic text

In various Ayurvedic compendium, *Punnaga* is distinctly mentioned. In *Chakradatta* (11th century AD), a formulation called *Nimbapatrasevanadi* is recommended for treatment in *Shitapitta chikitsa* (Management of urticaria) (49). In *Vangasen Sambita* (12th century AD), a decoction of leaves is recommended for *sechan* in the management of *Krushnagatropa* (Corneal diseases), also *Ajeyaghruta* as an antidote preparation for use in *Visha Chikitsa* (Treatment of poisoning) (50). *Chikitsamanjiri* (16th and 18th centuries AD) describes *Potalisweda* (sudation with bolus) of *Punnagadi churna*, indicated in management of *Vataryadhi* (51). In *Sabastrayoga* (20th century), *Punnaga* is mentioned as ingredient of *Eladi taila* recommended for *Varna Prasadana* (improving skin appearance), *Kandu* (Itching), *Koth* (Urticaria), and *Pitika* (Skin Papules) (52).

Materia medica (Nighantu)

In classical Ayurvedic *Nighantus*, *Punnaga* exhibits a synonymic duality to *Nagkeshar* (*Mesua ferrea* Linn). Some *Nighantus* mentioned *Punnaga* as distinct drug, while others list it simply as a synonym of *Nagkeshar*. These differences show complication in plant identification and classification can be more obvious. The comparative perspectives of different *Nighantus* considering mention points are explained in the following table:

Table 4: Different references of *Punnaga* in *Nighantu*:

Synonyms of <i>Punnaga</i>	KN (14)	MPN (16)	MN (17)	RN (18)	SrN (20)	AN (21)	SN (22)	AR (23)	Dh. N (53)	Sh. N (54)	Ni. She (55)
<i>Anantak</i>					+						
<i>Arun</i>				+							

<i>Champeya</i>							+			+	
<i>Devavallabha</i>	+						+				+
<i>Hrudya</i>					+						
<i>Kanchan</i>	+										
<i>Kesar</i>	+	+			+		+				+
<i>Keshav</i>	+										
<i>Kumbhika</i>											+
<i>Kusum</i>			+							+	
<i>Mahanag</i>	+										+
<i>Nag</i>	+										
<i>Nameru</i>						+					
<i>Padmakesar</i>					+						
<i>Panshu</i>	+		+								
<i>Patali</i>			+	+					+		
<i>Patalichada</i>	+		+								
<i>Patalipushpa</i>		+									
<i>Patrabhin</i>							+				
<i>Pravalmadhya</i>					+						
<i>Puman</i>				+					+		
<i>Punnama</i>	+		+	+							
<i>Purush</i>	+		+	+	+	+		+	+		+
<i>Raktakesar</i>	+					+		+			+
<i>Raktapushpa</i>	+			+					+		
<i>Raktarenu</i>				+					+		
<i>Shatapadalaya</i>	+	+									
<i>Shatpadapriya</i>			+								
<i>Sugandhi</i>	+		+								
<i>Surparni</i>	+										
<i>Tung</i>	+		+	+	+	+		+	+		+

(Abbreviations: KN- *Kaiyadev Nighantu*, MPN- *Madanapala Nighantu*, MN-*Madanadi Nighantu*, RN- *Raj Nighantu*, Sr.N- *Sarasvati Nighantu*, AN-*Ashtang Nighantu*, SN- *Sausbrut Nighantu*, AR- *Abhidhanaratnamala*, Dh.N.- *Dhamvantari Nighantu*, Sho.N.- *Sodhala Nighantu*, Ni.She.- *Nighantushesh*)

Table 4 of *Nighantu* clearly shows debate about the identity of drug *Punnaga Nighantus*, such as *Siddhamantra*, *Madhavdravyaguna*, *Shivkosh*, *Bhanprakash Nighantu* and *Abhidanmanjiri* described *Punnaga* as primary medicinal drug. *Raj Nighantu* separately mentioned two types of *Punnaga* i.e. *Punnaga* and *Nameru* but also referred *Punnaga* as synonym of *Nagakeshar*. In addition, *Nameru* is having same *gunas* (Attributes) as *Punnaga* causing confusion in both nomenclatures and identification. Again, *Kaiyadev Nighantu*

and *Nighantu shesh* mentioned *Kesar* as a synonym for both *Punnaga* and *Nagkesar*. Taken together, these references reveal textual ambiguity in Ayurvedic nomenclature. However, when cross comparison shows, the controversy can be understood by acknowledging *Punnaga* as independent drug and as part of a synonymic tradition.

Table 5: Vernacular names of *Punnaga*

Bengali	<i>Punnag, Sultanchampa</i>
Burmese	<i>Pongnyet</i>
English	Alexandrian Laurel, Punnay Tree
Gujarati / Cutch	<i>Udi, Undi</i>
Hindi	<i>Punnaga, Nagchampa, Sultanachampa, Undi, Surpan, Surpunka,</i>
Kannada	<i>Suragonne-mara, Surabonne, Nameru, Uma</i>
Konkani	<i>Undee phal</i>
Malayalam	<i>Punna, Cherupunna, Ponnakum</i>
Marathi	<i>Undi, Surangi, Undag, Pumag, Nagchampa</i>
Sanskrit	<i>Punnaga, Surangi, Nameru, Panchakaesara, Tung</i>
Sindhi	<i>Domba</i>
Tamil	<i>Punnai, Punnagam</i>
Telugu	<i>Punnagamu, Ponnachettu, Punnagamu, Nameru, Punnaga, Ponnnavittulu</i>

Table 5 shows the regional and vernacular names of *Punnaga* used in various parts of regions.

Attributes (*Rasapanchak*) of *punnaga*

Punnaga is defined in the Ayurvedic lexicons with its own *Rasapanchak* profile, confirm its independent identity in the Materia medica (*Nighantu*). *Punnaga* is predominately *Madhura* (Sweet) in taste, occasionally associated with *Kashaya rasa* (Astringent). *Punnaga* has *Sheeta* (Cold) potency and it's *Doshghnata* (Pharmacological action) as *Pittahara* (Pacifies Pitta) or *Pittakaphahara* (Pacifies both Pitta and Kapha). However, *Nagkesar* shows distinct attributes; therefore, its identity should not be confused with *Punnaga*.

Action and Indications

Table 6: Action and indications of *Punnaga*

Action and Indications	KN	MPN	MN	SN	SS	AS	AH	NR (56)
<i>Arochaka</i> (Anorexia)			+					
<i>Asthisandhan</i> (fracture healing)					+	+	+	
<i>Bhutavidhravan</i> (Expelling evil spirits)								+
<i>Chakshu roga</i> (Eye diseases)			+					
<i>Kandughna</i> (Anti-pruritic)				+				
<i>Koth</i> (Urticaria)				+	+	+	+	
<i>Pakvatisar</i> (Chronic Diarrhea)			+		+	+	+	
<i>Pidika</i> (Pustules)				+		+	+	

<i>Rakta dushti</i> (Impurity of blood)	+							+
<i>Raktapitta</i> (Hemorrhagic disorders)		+						+
<i>Shirorog</i> (Head disorders)			+					
<i>Varna Prasadana</i> (Skin complexion)				+	+	+	+	
<i>Vishghna</i> (Anti Toxic)			+		+	+		
<i>Vrana</i> (Wound)			+		+	+	+	

The diseases well defined in the table 6 indicates that *Punnaga* demonstrates a broad spectrum of therapeutic effects.

***Punnaga* (*Calophyllum inophyllum* Linn.) in Contemporary context**

In 20th - 21th century, *Punnaga* (*Calophyllum inophyllum* L.) is mentioned in various contemporary texts as an individual drug with its Morphology, Therapeutic role and Phytochemicals and Pharmacological activities.

Taxonomical Position (4)

- Kingdom: Plantae (plant kingdom)
- Subkingdom: Tracheobionta (vascular plants)
- Superdivision: Spermatophyta (seed plants)
- Division: Magnoliophyta (flowering plants)
- Class: Magnoliopsida (dicotyledons)
- Subclass: Dilleniidae
- Order: Malpighiales (modern classification)
- Family: Clusiaceae (also treated as Calophyllaceae in some systems)
- Genus: *Calophyllum* L.
- Species: *Calophyllum inophyllum* L. (distinct species)

Botanical Description

Calophyllum inophyllum Linn. is medium to large size, evergreen spreading tree that can reach up to the Height of 20 meters, with smooth bark having dark brown to almost black color presenting typical fissures and latex. The leaves are broad and obovate, and white colored flowers with distinct yellow anthers are in racemes, whereas slightly yellow drupes around 3 to 4 cm with smooth pericarp and spherical seeds. habitat of this Plant is along coastal areas and occurs above the high-water mark down to the sea edge on both the west coast and the east coast, and also common in the Andaman and Nicobar Islands (57). The naturally habitat of *Calophyllum inophyllum* Linn. matches well with classical Ayurvedic descriptions of *Punnaga*, which mention its occurrence in coastal or humid areas and its fragrant flowers. In Classical texts mainly describe the flower (*Pushpa*) of *Punnaga* as the important part, which corresponds to the aromatic flowers of *C. inophyllum* Linn. So, botanical and taxonomical evidence helps *Calophyllum inophyllum* as the correct plant equivalent to classical *Punnaga*.

Image 1: *Punnaga* (*Calophyllum inophyllum* Linn.)



Image 1 showing the flower of *Punnaga* (*Calophyllum inophyllum* Linn.) with its organelles.

Ethnobotany

Medicinal and Cultural ethnobotany confirms *Punnaga* (*Calophyllum inophyllum* Linn.) as a distinct drug with its local names and unique uses. Traditionally, the Oil is used to treat Rheumatism, Scabies, Skin eruption (58). and also used to treat itching and in the management of diabetes (59). while bark and resin used to treat ulcers and eye disorders, leaves used in inflammation and migraine (60), while the seeds kernels give dark yellow oil called “Domba oil” applied externally in Gonorrhea and other urinary tract infections. Gum of the injured bark is used in wounds and ulcers (61) Considering its versatile applications *Punnaga* holds distinct ethnobotanical identity and this multifunctionality confirm its own place in medicine culture.

Phytochemical Evidence

Leaves of *Punnaga* (*Calophyllum inophyllum* Linn.) are rich in a variety of bioactive compounds such as flavonoids, Xanthonenes, terpenoids, coumarins, fatty acids, steroids, esters and tannins (4). Seed contain essential amino acids such as arginine, leucine, lysine, methionine and valine and are rich in protein, fat (50-75%), and carbohydrates. Bioactive compounds: Calophyllolide, Inophyllolide, Calaustralin, Apetalolide, Calophyllic acid, Calophenic acid, Thophyllic acid, Inophenic acid, Pseudobrasilic acid, 4-alkyl coumarins, Xanthonenes (Leaves & Heartwood): Calophylxanthone, Jacareubin, 6-deoxyjacareubin, 1,7-dihydroxyxanthone, 1,6-dihydroxy-5-methoxyxanthone, 6-(3,3-dimethylallyl)-1,5-dihydroxyxanthone. Triterpenoids and Steroids: Friedelin, Friedelan-3 β -ol, β -sitosterol, Erythrodiol-3-acetate. Defatted Kernels / Oilcake: Contain calophyllolide and calophyllic acid; used as organic manure and for nematode control in agriculture (57). The stem bark is rich in xanthonenes and related compounds, inophinnin, inophinone, pyranojacareubin, rheediaxanthone A, macluraxanthone, caloxanthonenes (C and E), brasixanthone B, trapezifolixanthone, friedelan-3-one, and calophynic acid. The flower stamens contain flavonoids such as myricetin and quercetin. Fruit of this, contain phenolic acids, hydrocarbons β -sitosterol, inophyllum A, C, and E, calophynic acid (62).

Pharmacological Suggestion

This plant shows anticancer, hepatoprotective, antioxidant, antimicrobial, anti-inflammatory, cardioprotective, antibacterial, antifungal, analgesic, cardiovascular protective, and wound healing activity (57). It also has potent antiviral effects, particularly against HIV, along with strong immunomodulatory properties. In addition, *C. inophyllum* seed oil has gained attention for cosmetic applications due to its UV-absorbing, antioxidant, and skin-protective effects (62). Contemporary studies of *Calophyllum inophyllum* Linn shows the bioactive compounds and Pharmacological properties.

Ambiguity associated with *Punnaga*

The Ambiguity in Ayurvedic plants identification arises as textual terminology fails to establish true species identity [Figure 1]. The several factors contribute to create controversy in botanical identity. i.e. Multiple synonyms used inconsistently causes confusion in *Punnaga*'s identity. Classical sources provide limited taxonomical description on *Punnaga*. Applying same name to

different plant, e.g. *Kesar* creates ambiguity in *Punnaga*'s identity. Names like *Nagchampa* and *Punnagakesar* in vernacular traditions contribute to ambiguity in identity of *Punnaga*. Insufficient awareness of authentic sources of *Punnaga* leads to ambiguity. A single name is often applied to multiple species, creating ambiguity such confusion in drug identity described in traditional texts promote the practices of adulteration and Substitution. In case of *Nagkeshar* this issue manifest, being variously attributed to *Mesua ferrea* Linn., *Ochrocarpus longifolius* Benth and Hook f., *Calophyllum inophyllum* Linn, *Cinnamomum tamala* (Buch-Ham.) T. Nees & Eberm (8). Such overlying nomenclatures surges the risk of adulteration.

Mixing of genuine crude drugs with inferior or non-genuine materials for profit is defined as adulteration results in loss of authenticity and reducing trust in herbal medicines. *Mesua ferrea* Linn is authentic source for *Nagkeshar*, which is frequently adulterated with *Calophyllum inophyllum* due to high demand, morphological similarities, lack of awareness, and shortage of genuine drugs (63) (64). Additionally, *C. inophyllum* and *O. longifolius* of similar family are mentioned as *Punnaga* and *Surapunnaga* respectively & used as substitutes for genuine *Nagkeshar* in southern part of India (65). Today genuine source is the anthers of *Mesua ferrea* used and as substitutes other materials such as the flower- buds of *C.inophyllum*, *O.longifolius*, and fruits of some species of *Cinnamomum* are used (66).

Image 2: *Nagkeshar* (*Mesua ferrea* Linn.)



Image 2 showing the flower of *Nagkeshar* (*Mesua ferrea* Linn.) with its organelles.

DISCUSSION

This present assessment shows the polymorphic identity of *Punnaga* described in canonical Ayurvedic manuscripts [Table 1] and interpreted in contemporary literature. Classical texts such as *Sushrut Sambita*, *Ashtang Sangraha* and *Ashtang Hruday* mention *Punnaga* as a separate drug, and its role in therapeutic interventions stating its distinct identity [Table 2]. Usually in *Sambitas*, unnecessary redundancy was avoided; hence immediate citation of *Nagpushpa* and *Punnagakeshar* in *Eladi gana* suggested intentional distinction of *Punnaga* from *Nagkeshar*. Later commentators referred *Punnaga* by *Tung*, *Nagkeshar*, *Surapati* (*Surangi*) etc. such synonymic variations leading to confusion and difficult to identify its true identity [Table 3]. In addition, the commentators have not used the terms like *Champeya*, *Nagpushpa* and *Punnaga* consistently, this interchangeability of synonyms has raised ambiguity (19). However, these three terms must be interpreted as referring to distinct botanical entities. In Therapeutic text, *Punnaga* is individually defined for its therapeutic applications and its role in treating diseases which helps to minimize ambiguity. Data collected from various *Nighantu* suggests that *Punnaga* is accepted as distinct drug and not just a variant or synonym of *Nagkeshar*. However, the presence of shared synonyms assigned to both *Punnaga* and *Nagkeshar* in several *nighantus*, along with the inclusion of distinct synonyms, demonstrate synonymic complexity [Table 4]. This coexistence contributed to regional interpretative variations and eventually headed to confusion. *Nighantu shesh* and *Kaiyadev Nighantu* mentioned the common synonym of *Punnaga* and *Nagkeshar* raise ambiguity in their individuality. *Raj Nighantu* mentioned *Punnaga* as a synonym of drug *Nagkeshar* create confusion in identification of drug. These prolonged difference of *Punnaga* raise controversy about its exact botanical identity. Despite the absence of explicit evidence from Ayurvedic texts, it is observed that due to the similar action, such as *Varnya Prasadam*, *Vishaghna*, and *Kandughna* action of both drugs, the substitution of *Punnaga* for *Nagkeshar* in contemporary practice may have been encouraged [Table 6]. Textual variations, synonymic duality, overlapping vernacular names, regional variations create unpredictability in its identification and clinical use [Table 5]. The morphological similarity between the anthers of *Punnaga* [Image 1] and *Nagkeshar* [Image 2] often result in adulteration within the market

supply. Such substitution undermines both the authenticity and therapeutic efficacy of the drug (66). Contemporary texts described *Punnaga* (*Calophyllum inophyllum* L.) as an individual drugs with its Morphological characteristics, Pharmacological properties such as, antioxidant, antimicrobial, anticancer, anti-inflammatory etc. which supports its therapeutic role. Phytochemical evidence reveals the bioactive compounds such as xanthenes, flavonoids, terpenoids, steroids, coumarins etc. explain its potential. Therefore, clarifying the identity of *Punnaga* is essential to prevent misidentification and to ensure its safe application in pharmacology and integrative medicine.

Limitation of study: Being this is a narrative review; there were integral limitations in confirming the distinct identity of *Punnaga* due to the descriptive nature of the methodology.

CONCLUSION

This article highlights the unique identity of *Punnaga* from primary classical texts to contemporary medicinal texts, through its morphological characteristics, phytochemical and pharmacological evidence. In the *Nighantu* era, synonymic duality contributed to confusion in distinguishing *Punnaga* identity. There is no evidence of substitution for *Nagkeshar* is found in the literature. Thus, the literature establishes *Punnaga*'s distinct identity. Due to morphological similarities in flower buds and anthers, contemporary texts record their use as adulterants and subsequently as substitute. Authentic drug provides reliable clinical effectiveness, whereas ambiguity in plant identity result in adulteration that reduce efficacy. Further research is essential to validate individual identity of *Punnaga*, its use as substitute of *Nagkeshar*, secure its authenticity and effectiveness in clinical practices. Hence, future research should comprise comparative and controlled studies to bridge the remaining gaps and embrace evidence base. It will help establishing the unique identity of *Punnaga* by safeguarding authenticity in Ayurvedic practices. Additionally, strengthens its potential role in drug discovery and therapeutic innovation.

This review, thoroughly consolidate dispersed references on *Punnaga* from Classical Ayurvedic texts along with contemporary literature, thus creating a verified evidence base. Additionally, the review contributes to establish a foundational resource for future multidisciplinary research.

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