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An Appraisal on *Hastikarnapalasha vis-à-vis Leea macrophylla* Roxb. ex Hornem. w.s.r. to Ayurveda Literature and Different Floras of Medicinal Plants

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ABSTRACT

Background: Classical medicinal plants of Ayurveda, based upon their synonyms, were assigned botanical equivalents by the experts. Present paper deals with the difference of opinion about the already established botanical equivalent of *Hastikarna / Hastikarnapalasha*, i.e. *Leea macrophylla* Roxb. ex Hornem. (Family: Vitaceae).

Material & Methods: All available classical literature were critically analysed about the drug *Hastikarna* and its noted *Paryaya* (synonyms). Information on *L. macrophylla* and its botanical synonyms were collected from available floras. Synonyms were analysed for the morphological, pharmacological and therapeutic resemblance with *L. macrophylla* as described in various floras.

Results: The plant drug *Hastikarna / Hastikarnapalasha* possess *Tikta, Katu rasa, Sangrahi, Vikashi guna, Ushna veerya, Madhura vipaka* and have *Rasayana karma*. The plant either with a simple/unifoliate large leaf, or with trifoliate or with 1-3 pinnate leaves has been quoted in the floras, as *L. macrophylla*. No variety has been reported.

Conclusion: *L. macrophylla* bearing either of unifoliate, trifoliate or 1-3 pinnate leaves should be considered as botanical equivalents of classical ayurvedic plant *Hastikarna / Hastikarnapalasha*.

KEYWORDS

Hastikarnapalasha, Hastikarna, Hastikanda, Leea macrophylla, Ayurveda, Controversy



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INTRODUCTION

Plants have been used since ancient times for the treatment of various diseases. In Ayurveda, a set of names (*Paryaya*) are attributed to a single plant, as nomenclature of the plants, based on various criteria's like *Rudhi* (famous name by tradition), *Swabhava* (nature), *Deshokti* (name by which local peoples call it as per place of its production, marketing etc.), *Lanchana* (specific characteristic), *Upama* (analogy), *Veerya* (Potency/properties), *Prabhava* (specific action) etc¹. In this traditional nomenclature procedures, various plants have been coined with same names (Homonyms) or one single plant have been coined with various names (Synonyms). There are set of rules for nomenclatures of the plants known as *International Code of Nomenclature for algae, fungi, and plants* (ICN)^{2,3} and botanical names are mainly based on morphological features. The morphological or morphospecies concept is the oldest species concept and uses differences in morphological characters to distinguish species⁴. Based upon these synonyms, the botanical equivalent of these traditionally used plants like *Aamalaki*, *Haritaki*, *Guduchi* were assigned botanical names as *Emblica officinalis* Gaertn., *Terminalia chebula* Retz. and *Tinospora cordifolia* (Willd.) Miers ex Hook. f. & Thoms. respectively⁵.

The botanical equivalents of Indian medicinal plants can be traced in various flora and books related to ethnomedicines. The botanical sources of some plants are still in a state of controversy, and the cause of the controversy is as India is a country having a variety of languages and population dependent on different tribal and folklore medicine. The variation in the language sometimes is responsible for confusion in the nomenclature of different plants having similar name. Moreover, the descriptions of a plant in the ancient literature are found in verses having ample use of synonyms. These synonyms have caused controversy in the identification of plants and hence the correct source sometime is misleading with a fictitious plant. It has become an important task to generate parameters of identification as well as differentiation among different plant sources having a similar name^{6,7}. Many books and research articles have been published listing plants with controversial botanical identity in Indian medicine^{6,8}. Epithet *Hastikarnapalasha*, *Hastikarna* or *Hastikanda* is one among them. The accepted botanical identity of the *Hastikarna* / *Hastikarnapalasha* is *Leea macrophylla* Roxb. ex Hornem⁹, various flora describes it as a single plant having different morphological characters. It's morphological biodiversity is still a big



concern. It is presumed that the plant named as *Hastikarnapalasha* should have a single large size leaf like that of the *Hasti* (elephant) *karna* (ear)¹⁰. But the available flora, have different opinions about its size and distribution of its leaves. Hence, in this paper, an attempt has been made to deal in detail about the drug *Hastikarna/Hastikarnapalasha* and its botanical equivalent *Leea macrophylla* Roxb. ex Hornem. (Family: Vitaceae).

MATERIALS & METHODS

All available Vedic literature, Samhita granthas, Purana granthas and Nighantu granthas were searched with the key words like *Hastikarna* or its synonyms. Also, various commentaries available on the Ayurveda literature and textbooks of Dravyaguna were analysed using the above mentioned keywords. Ten available flora's were critically analysed for botanical equivalent of drug *Hastikarna* i.e. *L. macrophylla* and its botanical synonyms.

The obtained information from the classical texts such as synonyms and pharmacological properties were analysed for and a critical note was made by comparing the morphological characteristics as well as researches upon *L. macrophylla*. Based upon the results conclusion was drawn at last.

RESULTS

The delineations pertaining to *Hastikarna*, its synonyms, properties, actions, and indications on various disease conditions have been compiled vividly and obtained information have been presented in a precise paragraphs and tabular format thereon in systematic manner. Various synonyms attributed to *Hastikarna*, in classical texts of Ayurveda have been presented in as a brief note and properties, actions, and indications on various disease conditions in table 1 and paragraphs thereon.

Garuda purana (1500 BC– 300 BC), in a separate chapter, has described the *rasayana* properties of *Hastikarnapalasha*¹¹. This shows the importance of the drug at that point of time. In Samhita period (2000 B.C.-1300A.D.), Sushruta samhita (1000 B.C- 2th A.D) has quoted *Hastikarna* in *Sanshodhanashamaneeya adhyaya* (Su. S. Sutra 39/9) under *Kaphasanshaman dravya*¹⁰; in *Dravadravyavidhiradhyaya* (Su. S. Sutra 45/115),; properties of its seed oil as *Teekshna* Sharp), *laghu* (Light / Lightness), *ushna veerya* (Hot in potency), *katu rasa* (Pungent in taste), *katu paka* (Pungent post metabolic product), *sara* (mobile), *vata*, *kapha* pacifying and indicated in the *Krimi* (Worms), *Kushtha* (Skin disorders), *Prameha* (Diabetes) and



Shiroroga (Disorders pertaining to head)¹². In *Shwayathu chikitsadhyaya* (A. Hr. 17/27) of Ashtanga Hridaya (7th century A.D.), Vagbhata has advised *Sukhoshna kalka lepa* (Local application of tolerable hot paste) prepared from leaves of *Hastikarna* and other drugs in *Ekanga shotha*¹³.

In Nighantu`s, Siddhamantra (13th century A.D.) has quoted its *Kapha-Vataghna Pittaladravya* property under *Kapha-Vataghna Varga*¹⁴. In Kaiyadeva Nighantu: (15th century A.D.), *Hastikarna* has been quoted under *Oshadhi varga*, in the name of *Gajakarni* and various properties and indications of *Gajakarni*, *Gajakarni kanda* and *Jangali Gajakarni* has been described. *Gajakarni* points to the morphology of the plant as elephant`s ear like large leaf¹⁵. In Bhavaprakasha nighantu (16th century A.D.), *Hastikarna* has been quoted under *Shakavarga*, in the name of *Hastikarnaa* and *Gajakarnaa*, various properties and indications has been described. It`s *kanda* (tuber) has been said to pacify diseases like *Vanasuranakanda*¹⁶. In Saraswati nighantu (16th century A.D.) synonyms of

Hastikarna has been described under *Upala varga*. The synonym *Hastikarna* suggests plant is having large leaf¹⁷. In Raja Nighantu: (17th century A.D.), *Hastikanda* has been included in *Moolakadi varga*. Various synonyms, properties and indications of *Hastikanda* has been described¹⁸. In *Aushadhashraya pariccheda* of Rajavallabha nighantu (18th Century) *Vrishya*, *Medhayurbalavardhana* properties have been described. Though morphology has not been described, its name itself suggests having large leaf¹⁹.

Synonyms

The plant is mostly found in forests and hilly regions (*Vanyam*, *Giriwasi*), having big tuberous root (*Hastikanda*, *Sthoolakanda*, *Atikanda*, *Gajakanda*, *Nagakanda*), bearing beautiful large sized leaves as ear of elephant (*Gajakarni*, *Gajakarnaa*, *Hastipatra*, *Brihatapatra*, *Atipatra*, *Hastikarna*, *Hastikarnaa*, *Sukarnaka*, *Varanakarnakah*, *Hastikarnah*), indicated for the treatment of skin disorders (*Twakadoshari*, *Kushthahanta*). Most of the synonyms of plant are based on elephant (*Nagashraya*).

Table 1: Pharmacological properties of *Hastikarna*

Sr.No.	Name of Text	Rasa	Guna	Veerya	Vipaka	Dosha shamaka properties
1.	Kaiyadeva nighantu ¹⁵ (<i>Gajakarni</i>)	<i>Tikta</i>	<i>Sangrahi</i>	<i>Ushna</i>		<i>Vata-kaphahara</i> , <i>Vata-pittanashaka</i>



2.	Kaiyadeva nighantu ¹⁵ (<i>Gajakarni kanda</i>)	<i>Vikashi</i>	<i>Madhura</i>		
3.	Kaiyadeva nighantu ¹⁵ (<i>Gajakarni moola</i>)				<i>Kapha-pittanashaka</i>
4.	Kaiyadeva nighantu ¹⁵ (<i>Vanaja</i> variety-found in forest)	<i>Madhura, Tikta</i>	<i>Snigdha, Sheetal, Grahi</i>		<i>Tridosahara</i>
5.	Bhavaprakasha nighantu ¹⁶	<i>Tikta</i>	<i>Ushna</i>	<i>Madhura</i>	<i>Vata-kaphahara</i>
6.	Raja nighantu ¹⁸	<i>Katu</i>	<i>Ushna</i>		<i>Kapha-vata vikara</i>

Pharmacological properties

Details of the pharmacological properties, attributed to *Hastikarna* in various classical texts of Ayurveda are presented in Table 1

Authors are of different opinion about the properties of *Hastikarna*. Properties of different parts of *Gajakarni* has been described by Kaiyadeva nighantu. *Gajakarni* possesses *Tikta rasa*, *Ushna Veerya* and *Vatakaphahara* property. Its root possess *Vikashi guna* and *Madhura Vipaka* and *Kaphapittanashaka* property. It is having *Sangrahi* and *Vatapittanashaka* property. Its wild variety, *Vanajaa*, possesses *Snigdha*, *Madhura*, *Tikta*, *Tridosahara*, *Sheetala* and *Grahi* property¹⁵.

Bhavaprakasha reports the *Tikta rasa*, *Madhura Vipaka*, *Ushna veerya*, *Vata-Kaphashamaka* property and recommends its use in *Sheetajwara*¹⁶. Raja nighantu opines that the drug is having *Katu rasa*,

Ushna virya and *Kapha-vatahara* property¹⁸.

Karma (actions)

Various *Karma`s* (actions) of *Hastikarna* has been quoted by nighantu`s like *Vrishya* (Aphrodisiac)¹⁹, *Medhavardhana* (Nervine tonic)¹⁹, *Ayurvedhana* (Anti-ageing)¹⁹, *Balavardhana* (Improves strength and immunity)¹⁹ and *Sangrahi* (Absorbent, bowel binding)¹⁵. While *Vanaja Hastikarna* (wild variety) has been quoted as *Grahi* (Increase appetite, digestive power & absorb liquid from stool)¹⁵.

Rogagnata (Indications)

Hastikarna has been indicated in various ailments like *Shotha* (Swelling)¹⁶, *Pleeha* (Splenic disorders)^{15,16}, *Gulma* (Fantum tumors)^{15,16}, *Udara* (Abdominal disorders)^{15,16}, *Aanaha* (distention of abdomen due to incomplete evacuation of stool, urine and flatus)^{15,16}, *Sheetajwara* (fever)^{15,16}, *Pandu* (Iron deficiency



Anaemia)^{15,16}, *Shopha* (swelling)¹⁵, *Krimi* (Helminthes)^{15,16}, *Grihani* (Irritable bowel syndrome)^{15,16}, *Arsha* (Piles)^{15,16}, *Meha* (Diabetes)¹⁵, *Aruchi* (Anorexia)¹⁵, *Visha* (Poisoning)^{15,27}, *Murchha* (Syncope)¹⁵, *Mada* (Intoxication)¹⁵, *Trishna* (Xerostomia)¹⁵, *Twakadosha* (Skin diseases)¹⁸, *Shrama* (Fatigue)¹⁸, *Visarpa* (Erysipelas)¹⁸ and *Kushtha* (Skin disorders)¹⁸. While Vanaja *Hastikarna* (wild variety) has been indicated in *Trishna* (Xerostomia)¹⁵, *Pittaja Jwara* (Seasonal fever of Autumn)¹⁵, *Daha* (Burning sensation)¹⁵ and *Asravikara* (Diseases of blood)¹⁵.

In flora's, root of the plant has been indicated for the treatment of Guinea worm^{20,23}, Ring worm²³, wounds²², sores²²; root poultice for sores and sprain.²³ The root of the drug is said to possess Vermicidal, Antiviral and Anticancer activity²². It's use has been also quoted as Anodyne and Astringent²².

Commentators view

According to Dalhana, (12th century) *Hastikarna* is having a single large sized leaf like ear of the elephant. It is also known as *Bhoopalasha* and in other regions as *Rakta-eranda*^{10,12}. According to Vrinda, commentator of the Siddhayoga, *Hastikarna* is *Palasha*²⁴. Vopadeva is of the opinion that *Hastikarna* is *Rakta-eranda*

and elicited other's opinion of it as being *Mahaparno Bhusala*¹⁴. Acharya Chunekar, commentator of the Bhavaprakasha nighantu, describes the plant as having single large leaf¹⁶.

Textbooks of Dravyaguna

Among the available textbooks of Dravyaguna, Dravyaguna vigyana (P. V. Sharma) describes *L. macrophylla* as botanical equivalent of *Hastikanda/Hastikarnapalasha*²⁵.

However, Vaidya Bapalal in his book Some controversial plants of India²⁶, R. P. Trivedi in Sandigdha vanaushadhi darshika²⁷, Chunekar in the commentary of Bhavaprakasha nighantu¹⁶ has quoted *L. macrophylla* as a botanical equivalent of the *Hastikarna*.

But the *Hastikarna* as quoted by Acharya Chunekar is having single large leaf. On the contrary to it, R. P. Trivedi in his book Sandigdha vanuashadhi darshika, pointed out the opinion of Raja nighantu that plant is having both single large leaf or multi-leaves.²⁷

L. macrophylla: Botanical synonyms noted in various flora's presented in table 2 and key identifying characters of *L. macrophylla* mentioned in various flora's are presented in table 3.

Table 2: *L. macrophylla* species and their botanical synonyms



Sr.No.	Name of Flora	Leea species	Botanical synonyms	Reference
1.	Flora of Orissa	<i>Leea macrophylla</i> Roxb. ex Hornem.	<i>Leea robusta</i> Roxb. <i>Leea cinerea</i> Lawson <i>Leea coriacea</i> Lawson <i>Leea angustifolia</i> Lawson <i>Leea diffusa</i> Lawson <i>Leea parallela</i> Wall. Ex Lawson <i>Leea latifolia</i> Wall. Ex Kurz. <i>Leea venkobarrowii</i> Gamble.	29
2.	Flora of Saurashtra	<i>Leea macrophylla</i> Roxb. ex Hornem.	-	20
3.	Flora of Gujarat state	<i>Leea macrophylla</i> Roxb. ex Hornem.	<i>Leea latifolia</i> Wall.	30
4.	Flora of the presidency of Madras	<i>Leea macrophylla</i> Roxb.	-	31
5.	Forest flora of Gujarat state	<i>Leea macrophylla</i> Roxb. ex Hornem.	-	32
6.	Medicinal plants of India_karnataka	<i>Leea macrophylla</i> Roxb.	-	21
7.	Notable plants in Ethnomedicine of India	<i>Leea macrophylla</i> Roxb. ex Hornem.	-	22
8.	BSI_eFlora of India	<i>Leea macrophylla</i> Roxb. ex Hornem.	<i>L. aspera</i> Wallich ex G. Don <i>L. integrifolia</i> Roxb. <i>L. robusta</i> Roxb. <i>L. cinerea</i> M. Lawson <i>L. coriacea</i> M. Lawson <i>L. diffusa</i> M. Lawson <i>L. parallela</i> Wallich ex M. Lawson <i>L. talbotii</i> King ex Talbot <i>L. venkobarrowii</i> Gamble	23
9.	Flora of British India	<i>Leea macrophylla</i> Roxb.	<i>Leea latifolia</i> Wall. <i>Leea simplicifolia</i> Griff.	28

Table 3: Identification key of *L. macrophylla* species as mentioned in different floras

Sr.No.	Name of Flora	Leea species	Identification Key
1.	Flora of Orissa ²⁹	<i>Leea macrophylla</i>	1. Inflorescence not red. Flowers greenish or white 2. One secondary nerve to usually 3 or more teeth. 3. Leaflets without discoid glands beneath. 4. Leaflets pubescent beneath at least on the nerves. Lobes of staminal-tube entire or slightly notched or serrate.
2.	Flora of Gujarat state ³⁰	<i>Leea macrophylla</i>	1. Leaves simple
3.	Flora of the presidency of Madras ³¹	<i>Leea macrophylla</i>	1. Flowers white or greenish white 2. Leaves simple or with few large pinnules; anthers united in bud; herbaceous undershrubs. 3. Leaves simple, cordate, hoary puberulous beneath, very large, main nerves distant, slightly curved, branching near the margin into 3-4 small serratures; transverse nervules



			irregular; lobes of staminal tube entire or slightly cleft; fruit black.
4.	Forest flora of Gujarat state ³²	<i>Leea macrophylla</i>	Leaves simple
5.	BSI_eFlora of India ²³	<i>L. macrophylla</i>	1. Calyx mealy pubescent 2. Leaves 2 - 3-pinnate; rachis not winged
6.	Flora of British India ²⁸	<i>Leea macrophylla</i> Roxb.	1. Leaves simple

***Leea macrophylla* Roxb. ex Hornem.**

Description of *L. macrophylla* of family Vitaceae can be traced in various available flora.(table 2 & 3). Description of various parts i.e. leaf, inflorescence, fruits of *L. macrophylla* in these flora have been presented in a table no. 4, 5 & 6 respectively.

Nature of Root of *L. macrophylla*

Among 10 flora, only Flora of Saurashtra²⁰ and Medicinal plants of India-Karnataka²¹ has quoted that *L. macrophylla* bears tuberous root and having simple leaves. e-flora of India_BSI²³ (Leaves unifoliate, trifoliate, 1-3 pinnate) and Flora of British India²⁸ (Leaves simple) quotes that *L. macrophylla* bears root which yields dye but doesn't mentioned it's nature as tuberous. Photographs of simple and compound leaf *L. macrophylla* are shown in Fig. 1.1, 1.2 & Fig. 2.1, 2.2, 2.3, 2.4.

Fig. 1.1 & 1.2: *L. macrophylla* having simple/unifoliate leaf



Fig 1.1

Fig 1.2

Fig. 2.1, 2.2, 2.3 & 2.4: *L. macrophylla* having compound leaf



Fig. 2.1

Fig. 2.2

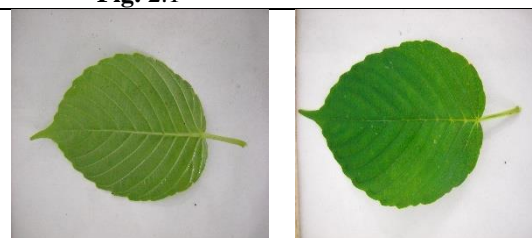


Fig. 2.3

Fig. 2.4

Table 4: Depicting the leaf characteristics of *L. macrophylla* as quoted in various flora

Leaf parts	Reference*		
	Unifoliate	Trifoliate	1-3 pinnate



Leaf morphology	Uni/tri- foliate or Pinnate leaf.	29,20,30,31,32,21,23,28	29, 23	29,33,22, 23, 28
Attachments	Petiole hirsute	29	29	
	Petiole striate/glabrous	20		
	Petiolute hirsute			29
Lamina	Ovate/Cordate/Suborbicular	29, 20, 30, 31, 21		
	Oblong/Ovate-oblong/Elongate-oblong/Oblong-lanceolate/Ovate-lanceolate			29, 33, 23
	Leaflets elliptic-oblong/Elliptic-lanceolate/ ovate-elliptic	23	23	22, 23
	Serrate	20, 28		29, 33, 22, 23
	Dentate	28		33
	Sublobed	20, 28		
	Repand	28		
	Stipules	29		22
	Stipules-obovate	23	23	
	Base	Rounded/Ovate/Sub-Cordate	28	
Cordate		23	23	
Apex	Acute			23
	Acute/Acuminata	20, 23	23	
	Acuminata-caudate			29, 33, 22, 23
Dimensions	30-60 cm	29		
	6.5-30 X 2.5-8.7 cms			29
Texture	Glabrous above/ Pubescent/cano-pubescent / hoary puberulous beneath	20, 30, 31, 28		29, 33
	Membranous			33
	Glabrous/Sparsely hairy above			23
	Sparsely to densely hairy / mealy pubescent beneath			23
	Chartaceous to Subcoriaceous			23
	Nerves	Opposite	20	
8-10 pairs		20		
4-14 pairs				23
Secondary nerves 11-13 pairs				29
Main nerves distant/slightly curved		31		
Nervules		Transverse nervules irregular	31	

Table 5: Depicting Inflorescence/ Flower characteristics of *L. macrophylla* as quoted in various flora

Inflorescence/ Flower	
Inflorescence	Corymbose cyme ^{29, 20, 33, 21, 22} , Broad cymes ³⁰ , Cymes puberulous ²⁸ , 2-3 chotomously branched ²⁹ , Geminate ²⁹ , Pubescent ²⁹ , Much branched ²³ , Freely branching ²⁸ . 17-38 cm ²⁹ , 30 cm ²⁰ , 5-15 cm ³⁰ , 12-45 cm ²³ , 1 ft. or more ²⁸ ,
Bracts	Deciduous ²⁹ , Deltoid to narrowly triangular ²³ , 6mm long ²³ .
Peduncle	25cm long ²³ .
Flower colour	Greenish-White ^{29, 22, 23} , White ^{29, 30, 21, 28} , small ²⁸
Staminal tube	White ²⁹ , Lobes entire ^{29, 31} , Slightly notched ²⁹ , Serrate ²⁹ , Deeply divided ²⁰ , Lobes oblong/entire/emarginated ²⁰ , Lobes rounded/entire ³³ , Lobes slightly eleft ³¹ .
Anthers	Connate in bud ²⁹ , Laterally united in bud ²⁰ , united in bud ³³ , Connected ²⁸
Calyx	Divided 1/3 of the way down ²⁰ , Lobes – triangular-ovate ²⁰ , Tipped with a small hard point ²⁰ , 1.5-3x2.5-4 mm ²³ , Mealy pubescent ²³ .
Corolla	Petals oblong ²⁰ .



Corolla lobes	Corolla lobes thick ²³ , 2-4x1.2 mm ²³ , Greyish pubescent to papillose ²³
Corolla tube	With staminodial lobes ²³ , 3-4 mm long ²³ , Staminodial lobes slightly retuse or shallowly cleft ²³ .
Ovary	6- loculed ²³ , Style 1-1.5 mm ²³ .
Flowering season	Aug-Sept. ²⁹ , July-Sept. ²⁰ , Aug-Oct. ^{33,30} , June-Sept. ²² , July-March ²³ .

Table 6: Depicting Fruit/Berry characteristics of *L. macrophylla* as quoted in various flora`s.

Fruit / Berry	
Colour	Purple-black ^{29,30} , Black ^{20, 31, 21, 22, 28} , Black when ripe ³³ , 3-6 celled ²⁰ , 3-6 lobed ²⁰ , 4-6 lobed ^{33,30} .
Shape	depressed-globose ^{20, 33, 21, 22}
Size	7.5-10 mm diameter ²⁹ , 0.3-0.4 cm ³⁰ , 10-15 mm ²³ , Size of small cherry ²⁸
Feature	Glabrous ³⁰ , Smooth & succulent ²⁸ .
Seeds	6 ²³ , 4x3 mm ²³ .
Fruiting season	Oct-Feb. ²⁹ , Aug-Oct. ³⁰ , June-Sept. ²² , July-March. ²³ .

DISCUSSION

The drug *Hastikarna* doesn't have any reference in the Charaka samhita. In Sushruta samhita, there are two references of the *Hastikarna*. On commentary of this section, Dalhana (12th century) clearly pointed out the morphology of the plant as having single large leaf which was known as *Bhoopalasha* in local language. At the same time Dalhana, also is of the opinion that *Rakta-eranda* has also been used in the name of *Hastikarnapalasha* in other regions. In *Dravadravyavidhiradhyaya* (Su. S. Sutra 45/115) seed oil of *Hastikarna* has been quoted as *Teekshna*, *Laghu*, *Ushna veerya*, *Katu rasa*, *Katu vipaka* and *Sara*, *Vata*, *Kapha* pacifying. Vrinda, commentator of the Siddhayoga has identified *Hastikarnapalasha* as *Palasha*. As per the opinion of the commentators, three plants such as i.e. *Bhoopalasha*, *Rakta-eranda* and *Palasha* should be considered in the name of the

Hastikarnapalasha. In Nighantus, plant has been described in the name of *Gajakarni*, *Gajakarni kanda*, *Hastikarna*, *Hastikanda* etc. Synonyms, when critically analysed, shows that *Hastikarna* / *Hastikarnapalasha* should have a tuberous root and a single large sized leaf. But according to R.P. Trivedi commentary on Narhari's opinion that it is multi-leaved plant, which is contradictory to the opinion of Dalhana i.e. *Hastikarnapalasha* is having single big leaf. Prof. R.S. Singh of BHU has identified *L. macrophylla* as a source plant of *Hastikarnapalasha*⁹. But in the description of Sushruta samhita, seed oil of *Hastikarnapalasha* has been indicated for treating the various ailments. But no documentary evidence up to date is available including ethnobotanical studies of that seed oil of *L. macrophylla* is used for any ailment. *L. macrophylla* has a biodiversity of leaves. Having single large leaf in some regions like Gujarat and South



India and having trifoliate or 1-3 pinnate leaf in another regions like Odisha etc. According to various flora's, despite of having unifoliate leaf i.e. having single large leaf, plant also bears trifoliate or 1-3 pinnate leaf in various regions. One of the key identifying feature of *L. macrophylla* as quoted by scientists of Botanical survey of India is that its leaf/leaflets are 5-7 nerved at base. The description of the plant described in the Ayurveda and commentators views points towards the plant bearing simple/unifoliate leaves. Hence *guna-karma* of the plant also should be studied before using it for the medicinal purpose. Further, plant bearing trifoliate or 1-3 pinnate leaves should also be used as source plants of the *Hastikarnapalasha* and their comparative properties may also be evaluated.

As per root of plant is concerned, *L. macrophylla* bearing simple leaves has tuberous root and others whether, trifoliate and 1-3 pinnate bears root yielding dye but it's tuberous nature has not been quoted by any flora. In Ayurveda, one of the synonym of the plant is *Hastikanda*, which is clearly pointing out the nature of the root as tuberous. Also wherever there is description of root in flora, it is said to be tuberous and/or yielding dye.

So far pharmacological properties of plant are concerned; few references are available

in flora. In therapeutic point of view, in Ayurveda, it has been indicated in *krimi* which matches with indication of flora as being used in Guinea worm, Ring worm and also as Vermicide, Antiviral. The plant has been indicated in *Twakadosha* and *Kushtha* in Ayurveda which matches with indication of flora as being used in sores. Despite of these indications flora also quoted it as having Anodyne, Astringent, Anticancer property and its use in sprain which doesn't has counter match indication in Ayurveda which are new indications of flora.

So far *Rasadi guna* and other properties of plant are concerned, up to date, no study has been reported validating any properties of the plant. However 12 pharmacological actions have been reported through preclinical studies which supports some of the folklore and traditional claims of it, which includes antiurolithiatic (whole plant), antimicrobial (leaf, seed, and root tuber), anti-inflammatory (leaf), membrane stabilizing (leaf), antithrombotic (leaf and whole plant), hepatoprotective (leaf), antioxidant (leaf), antinociceptive (root), cytotoxic (root), neuroprotective (root), antidiabetic (leaf), wound healing (root tuber), and cardiogenic (whole plant) activity³⁴. One of the article quotes its *Rasayana* property⁹ but not validated up to date based on scientific parameters.



However no comparative study has been reported till date to differentiate the simple/unifoliate, trifoliate and 1-3 pinnate leaves types of same botanical species viz. *Leea macrophylla*.

CONCLUSION

According to Ayurvedic literature, the drug *Hastikarna / Hastikarnapalasha* bears large leaves and should possess *Tikta, Katu rasa, Sangrahi, Vikashi guna, Ushna veerya, Madhura vipaka* and must have *Rasayana* properties. In recent texts related to medicinal plants, *Leea macrophylla* is considered as the botanical equivalent of *Hastikarna / Hastikarnapalasha* which is having either simple/unifoliate or trifoliate and 1-3 pinnate leaves. None of the texts reports the variety of *L. macrophylla* based upon either leaves or roots. It clearly points out the morphological difference of the plant according to bio-geographical area. Therefore *L. macrophylla* bearing either single leaf or trifoliate or 1-3 pinnate leaf should be considered as botanical equivalents of *Hastikarna / Hastikarnapalasha*.

Note: Source of Photograph in figure 1.2 is ENVIS centre on medicinal plants of FRLHT while all other photographs are taken by author himself from field.



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