Available online through

www.jbsoweb.com

Review Article

CONFIRMATION OF THE BOTANICAL SOURCE OF BEEJAPPOORA: A SYNONYM BASED STUDY

Panara Kalpesh^{1*}, Karra Nishteswar²¹PhD scholar, Department of Dravyaguna, IPGT and RA, Gujarat Ayurved University, Jamanagar, India²Professor and Head, Department of Dravyaguna, IPGT and RA, Gujarat Ayurved University, Jamanagar, India

*Correspondence

Panara Kalpesh
PhD scholar, Department of
Dravyaguna, IPGT and RA, Gujarat
Ayurveda University, Jamanagar, India

DOI: 10.7897/2321-6328.01423

Article Received on: 22/10/13

Accepted on: 13/11/13

Abstract

Morphological and therapeutic data of medicinal plants have been documented precisely in the form of their synonyms in various Nighantus (lexicons). Interpretation and analysis of synonyms related to the morphological characters and therapeutic uses may help to identify the correct botanical source of the plant. Beejapoor, an Ayurvedic classical medicinal plant, has been identified as *Citrus medica* Linn. Objective of this study is to discuss about the acceptance of *Citrus medica* L. as the source plant of Beejapoor and to establish this view, synonyms of Beejapoor were compiled from 10 prime Nighantus (Ayurvedic lexicons) and analyzed to collect the morphological and therapeutic data. Further, it was compared with *Citrus medica* in terms of habit, habitat, morphological characters and pharmacological activities. Analysis indicates *Citrus medica* is accurately recognized as genuine botanical source of Beejapoor.

Keywords: Beejapoor, *Citrus medica*, Matulunga, Nighantu, synonyms

INTRODUCTION

Herbs have been utilized since Vedic period for medicinal purposes¹. Ayurveda, a branch of Atharvaveda is ancient science of the life mainly related with health and its management. Ancient Acharyas of Ayurveda had employed mostly plant materials as drugs for management of various ailments that were commonly available in surroundings nature. Herbs and its formulations for various diseases well documented in literature are well-known as Samhita. Before Samhita era, the identification method for medicinal plants was not developed therefore Acharya Charaka suggested the collection of ethno-medicinal information of the drug from forest dwellers to identify the medicinal plants used in the treatment of various diseases. He firstly coined some synonyms for important herbs which are indicated for Shodhana therapy². These synonyms were formulated based on plant's important morphological and therapeutic profiles. Thus, a method, to describe the morphology of medicinal plant was started in Charaka Samhita in form of synonyms. After Samhita era, Nighantus (lexicons) were written specially to collect the botanical and pharmaco-therapeutic information of herbs. Further, authors of Nighantus have amplified the method of synonym formation³ and generated more identical synonyms based on morphology and therapeutic utility by which plant can be identified easily. The botanical source of many classical plants is yet to be established. Interpretation and analysis of plant synonyms which indicates the morphological and therapeutic characters helps to identify the correct botanical source of the specific plant. Beejapoor, an Ayurvedic medicinal plant, has already been identified as *Citrus medica* Linn. Objective of this study is to discuss about the acceptance of *Citrus medica* L. as the source plant of Beejapoor. An attempt has also been made to establish the identification method of unidentified classical plants with the help of synonyms. Here, synonyms of Beejapoor have been compiled from 10 prime Nighantus

(Ayurvedic lexicon of medieval period) namely Dhanvantarinighantu (DN), Shodhananighantu (SDN), Madanapalnighantu (MN), Kaiyadevnighantu (KN), Rajnighantu (RN), Bhavaprakasa (BPN), Saligramanighantu (SLN), Saraswatinighantu (SN), Priyanighantu (PN) and Nighantu Adarsha (AN) for the analysis.

Historical Review

In Indian literature, *Citrus medica* was recognized first as Matulunga (synonym of Beejapoor) by Panini⁴ (7th century B.C.), great writer of ancient India in his text namely Paniniya Unadi Bhogavritti⁵. In Samhita age, Charaka frequently used this plant as a therapeutic agent in many conditions with various formulations. Charaka⁶ (2nd or 3rd century B.C.) mentioned Beejapoor in Hridya-dasemani (group of 10 drugs which have cardio-protective property), Chardinigrahana-dasemani (group of 10 drugs which have anti-emetic property), Phala-varga (fruit category) and Amla-skandha (sour taste group). He also used Beejapoor in Jwara (fever), Shoola (Acute abdominal pain), Gulma (Tumour like growth), Madatyaya (Alcohol intoxication), Visha (poison), Chardi (vomiting) diseases⁷. Sushruta⁸ (2nd century B.C.) differentiated the therapeutic uses of Beejapoor according to its parts like Twak (peels), Mansa (fruit pulp), Keshara (filament of fruit pulp), Swarasa (fruit juice). He also indicated Beejapoor in Vrana (ulcer), Vatavyadhi (specific disease caused by Vatadosha), Karnashoola (earache), Raktabhishyanda (conjunctivitis caused by Rakta), Jwara (fever), Gulma (chronic abdominal pain), Udara (ascetis), Sopha (inflammation) Diseases⁹. After Samhita age¹⁰ (after 6th century A.D.), Paryaya (synonyms) of Beejapoor were formulated by authors of Nighantus which refer about habitat, morphological characters, properties, actions and uses of Beejapoor. These Paryayas ultimately provide key for establishing identification of Beejapoor.

Nirukti (Etymology)

Beejapoorā- Bijen phalam pooryate iti |¹¹ The fruit contains many seeds.

Paryaya (Synonyms)

The author of Rajanighantu has furnished the format for framing synonyms of drugs such as; Rudhi (traditional usage), Prabhava (effect), Desyokti (habitat), Lanchana (morphological character), Upama (simile), Virya (potency) and Itarahvaya (names prevalent in other regions or due to

other factors)¹². According to Dhanvantarinighantu, names, one or many, are assigned to plants based on habitat, form, color, potency, taste, effect etc¹³. Table 1 shows synonyms of Beejapoorā reported from various Nighantus of Ayurveda. In total 37 synonyms have been mentioned in 10 prime Nighantus, and synonyms like Bijapurna, Phalapuraka, Kesharamla, Matulunga, Supuraka and Ruchaka are frequently quoted. Dhanvantarynighantu quoted maximum number (17) of synonyms for Beejapoorā.

Table 1: Synonyms of Beejapoorā reported in various Nighantus of Ayurveda

S. No.	Paryaya (synonyms)	DN ¹⁴	SDN ¹⁵	MN ¹⁶	KN ¹⁷	RN ¹⁸	BPN ¹⁹	SLN ²⁰	SN ²¹	PN ²²	NA ²³
1	Bijapurna	+	+		+	+					
2	Beejapoorā	+	+		+	+	+	+	+	+	+
3	Keshara	+									
4	Phalapuraka	+	+		+		+	+	+	+	
5	Puraka	+				+					
6	Kesharamla	+	+		+	+					
7	Matulunga	+			+	+	+	+	+	+	+
8	Supuraka	+	+		+	+					
9	Varamla	+									
10	Beejaka	+	+			+					
11	Lunga	+	+		+					+	
12	Ruchaka	+	+			+	+	+	+	+	
13	Madhyakeshara	+									
14	Krimighna	+									
15	Gandhakusuma	+									
16	Kesharee	+	+								
17	Sindhupadapa	+									
18	Matulinga		+								
19	Beejahva		+		+						
20	Suphala		+								
21	Kriminashana		+								
22	Madhyamlakeshara				+						
23	Purakahva				+						
24	Supura				+						
25	Sidhuvriksha				+						
26	Beejapuraka								+		
27	Amlakeshara								+		
28	Shumanhphala								+		
29	Phalapura										+
30	Madhulunga										+
31	Matulungaka										+
32	Purnabeeja					+					
33	Sukeshara					+					
34	Beejaphalaka					+					
35	Jantughna					+					
36	Danturatvacha					+					
37	Rochanaphala					+					

Classification and Interpretation of Synonyms

As mentioned above, synonyms indicate the plant's habit, habitat, morphological characters, organoleptic characters, properties, actions and therapeutic uses and can be classified accordingly and details are furnished in Table 2.

Table 2: Classification and Interpretation of Synonyms of Beejapoor

Classification	Synonyms	Interpretation
Based on habit	Sindhupadapa, Sindhuvriksha	It is a shrub or small tree
Based on Habitat	Sindhupadapa, Sindhuvriksha	It grow near seaside.
Based on Morphological character		
Beeja (seed)	Bijapurna, Beejapoor, Beejaka, Beejahva, Beejapuraka, Purnabeeja, Beejaphalaka	Its fruit is full of seeds.
Keshara (pulp filament)	Keshara, Madhyakeshara, Kesharee, Sukeshara	Its fruit pulp has filament like structure.
Phala (fruit)	Phalapuraka Phalapura	Tree has numerous fruits so it looks like full of fruits.
Based on Organoleptic character		
Sparsha (stature)	Danturatvacha	Fruit's peels have warty surface.
Rasa (taste)	Kesharamla, madhyamlakeshara, amlakeshara	Fruit's filament and fruit pulp has sour taste.
	Varamla	It is a highly sour.
Gandha (smell)	Gandhakusuma,	Its flowers are aromatic
	Shumanhphala	Its fruit also have pleasant smell.
Based on Properties and Actions	Ruchaka, Rochanaphala,	Its fruit is tasty and edible
	Madhulunga	Its fruit has sweet taste
Based on Therapeutic uses	Matulunga, Lunga, Matulungaka, Matulinga,	It cures anorexia
	Krimighna, Kriminashana	It kills krimi (worms)
	Jantughna	It has Anti-bacterial effect ²⁴⁻²⁵

Based upon synonyms compiled from lexicons, Beejapoor can be described as follows;

It is a shrub or small tree, grows near seaside (Sindhupadapa and Sinduvriksha). Flowers are aromatic (Gandhakusuma). Fruits are numerous (Phalapuraka); with full of seeds (Beejaphalaka); aromatic (Shumanhphala), acidic (Varamla), tasty and edible (Rochanaphala), also possesses sweet taste (Madhulunga). Peels have warty surface (Danturatvacha) and fruit pulp has filament like structure (Madhyakeshara). Filament and pulp are acidic in taste (madhyamlakeshara). Beejapoor cures anorexia (Matulunga) and also possesses vermifuge (Krimighna) and Anti-bacterial (Jantughna) activities.

Morphological Characters of *Citrus medica*

It is an evergreen shrub or small tree, 1.8-3.6 m. high with stems up to 10 cm diameter. Young shoots are glabrous; bark smooth, yellowish brown. Blade is 2.5 mm, pale orange or pale yellow; Branches up to about 5 cm diameter; armed with

sharp, stout, straight, axillary thorns up to 7.5 cm long. The branches are often procumbent, and rooting freely in contact with the ground. Leaves are 7.5-15 by 3-7.5 cm, oblong or elliptic with acute or rounded apex, rather obscurely crenate-serrate, coriaceous, glabrous, pellucid-punctate, dull dark green above. Petiole is 5-12 mm long, sometimes very narrowly winged. Flowers are 3.8-4.5 cm in diameter, scented, white tinged pink outside, often unisexual, in few-flowered axillary cymes up to 2.5 cm long, or solitary. Pedicels are 3.8-6 mm long. Fruits are 5-7.5 cm long, oblong or obovoid with obtuse mamilla and scanty sub-acid pulp. Rind is usually warty, thick, tender and aromatic. Seeds are numerous, ovoid, about 1 cm x 0.5 cm, acute and mono embryonic²⁶⁻²⁷.

Pharmacological Activities of *Citrus medica*

Various experimental studies have been carried out on different parts of *Citrus medica*²⁸ plant and the important findings are tabulated below (Table 3).

Table 3: Reported activities of various parts of *Citrus medica*

Part used of <i>Citrus medica</i> L.	Reported activity	Researcher
Leaf	Anthelmintic	Bairagi G.B. <i>et al.</i>
	Estrogenic	Taha S. <i>et al.</i>
Fruit	Analgesic	Archana Negi <i>et al.</i>
	Anticancer	Maliheh E. <i>et al.</i>
	Insulin secretagogue	Chiung-Huei Peng <i>et al.</i>
	Antiulcer	B. Nagaraju <i>et al.</i>
Peel	Hypoglycaemic	C. Filomena <i>et al.</i>
	Anticholinesterase	C. Filomena <i>et al.</i>
	Hypocholesterolemic	Federica Menichini <i>et al.</i>
	Hypolipidemic	Federica Menichini <i>et al.</i>
	Antimicrobial	Kabra AO <i>et al.</i>
	Anthelmintic	Raj RK <i>et al.</i>
Seed	Antidiabetic	Archana N. <i>et al.</i>
	Hypocholesterolemic	Archana N. <i>et al.</i>
	Hypolipidemic	Archana N. <i>et al.</i>
	Estrogenic	Sharangouda <i>et al.</i>

Table 3 shows *Citrus medica* leave possesses anthelmintic and estrogenic activities; fruit has analgesic, anticancer, insulin secretagogue and antiulcer activities; fruit peel possesses many qualities including hypoglycaemic, anti cholinesterase, hypocholesterolemic, hypolipidemic, anti microbial and anthelmintic properties; seed has anti diabetic, hypocholesterolemic, hypolipidemic and estrogenic activities.

Comparison (Beejapoorā v/s *Citrus medica*)

Certain synonyms enumerated in various Nighantus reflect the salient morphological characters of *Citrus medica* (Table 4). Further, one identical synonym of Beejapoorā i.e Danturatwacha (dentine surface of fruit) confirms that plant Beejapoorā should be identified as *Citrus medica* (citron) because fruits of only this species among citrus family possess warty surface

Table 4: Comparison between synonyms of Beejapoorā and characters of *Citrus medica*

	Synonyms of Beejapoorā	Equivalent characters of <i>Citrus medica</i> ²⁹⁻³²
1	Sindhupadapa or Sindhuvriksha	Shrub or small tree
	Danturatwacha	warty surface of fruit
2	Beejaphalaka	Seeds are numerous
3	Shumanhphala	Fruit is fragrant
4	Varamla or Madhulunga	pulp is sour and sweet in taste
5	Rochanaphala	Per 100 g edible portion, citron fruits contain approximately: water 87 g, protein 0.08 g, fat 0.04 g, fiber 1.1 g, ash 0.4 g and ascorbic acid 368 mg.
6	Madhyamlakeshara	From the endocarp, string-like “hairs” extend into the locules,
7	Matulunga	Antiulcer
8	Krimighna	Anthelmintic activity
9	Jantughna	Antimicrobial activity

Thus, the analysis of synonyms mentioned for Beejapoorā and its comparison with profiles of external morphological and pharmacological characters of *Citrus medica* indicate that *Citrus medica* appears to be the correct botanical source of Beejapoorā. Synonyms served the purpose well for which they were coined e.g. indicating specific characters of plants which helped their proper identification. Acharya Caraka used the synonyms strictly for a single item which did not denote any other entity leading to confusion. But in course of time, by medieval period, a large number of synonyms accumulated which denoted more than one plant and thus lost accuracy. Irrational coining of inaccurate synonyms confused the issue of identification rather than solving it which further resulted in creating a group of so-called controversial plants. In this situation, one has to be selective and cautious and choose only those synonyms which are meaningful and significant for identification. Like Beejapoorā, other unidentified classical plants can be identified taxonomically basing on synonyms. To evaluate the genuine species for unidentified classical plants, synonyms of unidentified classical herb should be interpreted and the morphological and pharmaco-therapeutic profiles should be generated. In second stage, synonym based profile should be analyzed and compared with botanically identified plants described in floras. Plant species which are morphologically equivalent

with classical profile should be listed. Further, suspected comparable botanical species should be evaluated experimentally with the help of Karma based synonyms to produce pharmacological profile of those species. In this screening process, the plant which possesses maximum characters equivalent to the morphological and pharmacotherapeutic profiles of classical plants should be authenticated as correct botanical source for that unidentified classical plant.

CONCLUSION

Critical analysis of synonyms of Beejapoorā like Rochanaphala, Madhyamlakeshara, Matulunga, Krimighna, Jantughna, Madhulunga, Varamla, Shumanhphala, Beejaphalaka, Sindhuvriksha shows that it can be correlated with *Citrus medica* from botanical and pharmacological perspectives and therefore *Citrus medica* is accurately recognized as genuine botanical source for Beejapoorā.

REFERENCES

- Sharma PV. Dravyaguna Vijnana, part 4, Chaukhambha Bharati Academy, Varanasi; 2003. p. 5. PMCid:PMC162168
- Vaidhya Jadavaji Trikamji Acharya, editor, Charaka Samhita, Sutrasthana, chapter 1 and Kalpasthana, chapter 1-12, 1st edition, Varanasi: Chaukhambha Orientalia; 2009. p. 22, 653-76.

3. Sharma Priyavrat. Namarupajnanam- introduction, 1st edition, Varanasi, Satyapriya Prakashana; 2000. V.
4. Sharma PV. Ayurveda Ka Vijnanika Itihasa (Scientific History of Ayurveda), Varanasi, Chaukhamba Orientalia; 2011. p. 115.
5. Sharma PV. Dravyaguna Vijnana (Vedic Plants and History of Dravyaguna), Varanasi, Chaukhamba Bharati Academy; 2003. p. 115. PMID:12593504
6. Sharma PV. Ayurveda Ka Vijnanika Itihasa (Scientific History of Ayurveda), Varanasi, Chaukhamba Orientalia; 2011. p. 119.
7. Vaidhya Jadavaji Trikamji Acharya editor, Charaka Samhita, Sutrasthana, chapter 5 and Vimanasthana chapter 8, 1st edition, Varanasi: Chaukhamba Orientalia; 2009. p. 33, 161, 284.
8. Sharma PV. Ayurveda Ka Vijnanika Itihasa (Scientific History of Ayurveda), Varanasi, Chaukhamba Orientalia; 2011. p. 87. PMID:PMC3550563
9. Vaidhya Jadavaji Trikamji Acharya, editor, Sushruta Samhita, Sutrasthana, chapter 46, 1st edition, Varanasi, Chaukhamba Krishnadas Academy; 2004. p. 161.
10. Sharma PV. Ayurveda Ka Vijnanika Itihasa (Scientific History of Ayurveda), Varanasi, Chaukhamba Orientalia; 2011. p. 181.
11. Sastry JLN. Ayurvedokt Aushadhniruktamala, Varanasi, Chaukhamba Orientalia; 2001. p. 77.
12. Tripathi Indradev, editor, Raj Nighantu, Varanasi, Chaukhamba Krushnadasa Academy; 1998. p. 4.
13. Sharma Priyavrat, editor, Dhanvantri Nighantu, 4th edition, Varanasi, Chaukhamba Orientalia; 2005. p. 4.
14. Sharma Priyavrat, editor, Dhanvantri Nighantu, 4th edition, Varanasi, Chaukhamba Orientalia; 2005. p. 152-53.
15. Sharma Priyavarta, editor, Shodhala Nighantu, Baroda, Oriental institute; 1978. p. 62 and 131.
16. Tripathi Hariharaprasad, editor, Madanapala Nighantu, Phala varga, Varanasi, Chaukhamba Krushnadasa Academy; 1998. p. 71.
17. Sharma Priyavrata and Sharma Guruprasada, editors, Kaiyadeva Nighantu, Oshadhi Varga, Varanasi, Chaukhamba Orientalia, 2nd Edition; 2006. p. 50-51.
18. Tripathi Indradev, editor, Raj Nighantu, Varanasi, Chaukhamba Krushnadasa Academy; 2008. p. 370-72.
19. Dr Pandey GS, editor, Bhavaprakasha Nighantu, Varanasi, Chaukhamba Bharati Academy; 2009. p. 563.
20. Lala Shaligramji Vaishya, Shaligrama Nighantu, Bamba, Khemaraja Shrikunhadasa Prakashana; 2004. p. 435.
21. Kamat SD, Saraswati Nighantuh, Delhi, Chaukhamba Sanskrit Pratishtan; 2006. p. 32.
22. Sharma Priyavrat, Priya Nighantu, Varanasi, Chaukhamba Surbharati Prakashan; 2004. p. 83-84.
23. Bapala vaidhya, Nighantu Adarsha, Varanasi, Chaukhamba Surbharati Prakashan; 1988. p. 225-29.
24. Shastry JLN. Ayurvedokt Aushadhniruktamala, Varanasi, Chaukhamba Orientalia; 2001. p. 77.
25. Sir Monier Monier-Williams, A Sanskrit- English Dictionary, Delhi, Motilal Banarsidass Publishers; 2002.
26. KR Kirtikar, Basu BD. Indian medicinal plants Vol - I, Singh Bishen, Singh Mahendra Pal; 1991. p. 486-88.
27. Jones DT, *Citrus medica* L. In Coronel RE and Verheij EWM. Eds.: Plant Resources of South-East Asia. No. 2: Edible fruits and nuts. Prosea Foundation, Bogor, Indonesia; 1992. p. 131-133.
28. Kalpesh P, Krutika J, K Nishteswar. A Review on Phytochemical and Pharmacological Properties of *Citrus medica* Linn, International Journal of Pharmaceutical and Biological Archives 2012; 3(6): 1292-1297.
29. Home page: National Tropical Botanical Garden, *Citrus medica*. Available from, https://ntbg.org/plants/plant_details.php?plantid=2870; 2013.
30. KR Kirtikar, Basu BD. Indian medicinal plants Vol-I, Singh Bishen, Singh Mahendra Pal; 1991. p. 486-88
31. Home page: Citron. Available from, <http://en.wikipedia.org/wiki/Citron>; 2013.
32. Kalpesh P, Krutika J, K Nishteswar. A Review on Phytochemical and Pharmacological Properties of *Citrus medica* Linn, International Journal of Pharmaceutical and Biological Archives 2012; 3(6): 1292-1297.

Cite this article as:

Panara Kalpesh, Karra Nishteswar. Confirmation of the botanical source of Beejapoor: A synonym based study. J Biol Sci Opin 2013; 1(4): 389-393 <http://dx.doi.org/10.7897/2321-6328.01423>

Source of support: Nil; Conflict of interest: None Declared