

## COMPARATIVE STUDY ON MAHABHAUTIKA EVALUATION IN PUGAPHALA AND UDUMBARA TWAK THROUGH PHARMACOGNOSTICAL ANALYSIS

Kamla Moond<sup>1\*</sup> and Harisha C. R.<sup>2</sup>

<sup>1</sup>Lecturer, Dept. of Basic Principles, Sblid Ayurved Vishwa Bharti, Sardarshahar, India. 331403.

<sup>2</sup>HOD., Dept. of Pharmacognosy, I.P.G.T and R.A., GAU, Jamnagar, Gujarat, India. 361008.

Article Received on  
23 Sept. 2019,

Revised on 13 Oct. 2019,  
Accepted on 03 Nov. 2019

DOI: 10.20959/wjpr201913-16200

### \*Corresponding Author

**Kamla Moond**

Lecturer, Dept. of Basic  
Principles, Sblid Ayurved  
Vishwa Bharti, Sardarshahar,  
India. 331403.

### ABSTRACT

**Background:** In Ayurveda *Pugaphala* (*Areca catechu* Linn) and *Udumbara Twak* (*Ficus glomerata* Roxb) both are used in many compound formulations since long and are traditionally popular for their medicinal properties. Both the drugs are used internally as well as externally in various dosage forms as a Diuretic, Digestive, Anthelmintic, Astringent, cardiotonic, anti-oxidant activity etc. because of their *Kashaya Rasa, Sheeta, Ruksha* and *Vishtambhi Guna* due to *Prithvi Mahabhuta*. **Objectives:** Assessment of *Mahabhautika* dominance in *Pugaphala* and *Udumbara Twak* by pharmacognostical (Macroscopic and Microscopic) study with the help of classics.

**Method:** In present study *Pugaphala* and *Udumbara Twak* were selected as *Prithvi Mahabhuta* dominant drugs according to their *Rasa Panchaka*, and then pharmacognostical study was carried out based on morphological features, organoleptic characters and powder microscopy of these drugs under Carl Zeiss Trinocular microscope. **Result:** The results shows that both the drugs possess *Prithvi* dominant characters like crystal fibers, stone cells, cystolith, rhomboidal crystals etc. among them *Udumbara* sample is found to be more *Parthiva* in *Mahabhautika* dominance by possessing more hard and dense contents. **Conclusion:** Macroscopic and Microscopic evaluation of *Pugaphala* and *Udumbara Twak* showed the specific characters which are dense in nature and compactly arranged thus validate the *Prithvi* dominance in both the drugs along with *Udumbara Twak* possess more *Parthiva* characters.

**KEYWORDS:** *Udumbara*; *Puga*; *Prithvi mahabhuta*; Pharmacognosy.

## INTRODUCTION

India has a rich source of plant biodiversity possessing tremendous medicinal properties. Areca nut (seed of *Areca catechu*) has been used for medicinal properties more than 2000 years in South Asian countries. Areca nut is consumed by people from different parts of Asia, including India. The Areca Nut is the seed of the areca palm (*Areca catechu*), which grows in much of the tropical Pacific, Asia, and parts of east Africa. It is commonly referred to as betel nut or supari, as it is often chewed wrapped in betel leaves (paan). Areca nut is a common masticator nut, consumed by all sections of the population, cutting across caste, region, religion, age and gender in India. Areca nut forms an essential requisite for several religious and *social ceremonies* and its use dates back to Vedic period with high antiquities.<sup>[1]</sup> In India, it is extensively used by large sections of the people and it is very much linked with religious practices. *Udumbara* is also a well known drug for its use since ancient times. *F. glomerata* commonly known as *Gular* or *Udumbara*, found in all parts of India. It is found in moist localities like sides of ravine, along banks of streams and also on rocky slopes. *Atharvaveda* considers this as a divine plant and much used in religious sacrifice. It is believed that sacred fire produced by *Udumbara* wood generates prosperity, welfare, wealth, glory and energy. *Udumbara* mentioned as the donor of various things of daily usage and destroyer of enemies.<sup>[2]</sup>

The drug *Puga* is used internally as well as externally in various dosage forms like *Churna*, *Taila*, *Asava* –*Arishta* etc. In Ayurvedic medicine, betel nut is used as a Diuretic, Digestive, Anthelmintic, Astringent, cardiogenic and used extensively in Ayurveda to treat *Mukhavikara*, *Aruchi*, *Yonishathilya*, *Shvetapradara* etc. The chemical entities of this plant has been used as an anti-diabetic, blood pressure regulating activity, anti ulceogenic, antioxidant activity, anticonvulsant activity, CNS stimulant activity, oxytocic activity, anti fertility, anthelmintic and antiviral activity etc.<sup>[3]</sup>

*Ficus glomerata* Roxb. is a popular medicinal plant in India, which has long been used extensively since the times of Vedas in spiritual practices in Ayurveda to treat bleeding disorder, Leucorrhoea, Menorrhagia, fractured bones, complexion enhancer and wound healing because of its *Kashaya Rasa*, *Sheeta*, *Ruksha* and *Vishtambhi Guna* due to *Prithvi Mahabhuta*. *Acharya Charaka* mentioned the properties of *Udumbara* as *Guru*, *Sheeta* and *Vishtambhi* (antagonist to motion) and causes stoutening effect in body.<sup>[4]</sup> *Acharya Vagbhatta*

describes *Udumbara* as *Ruksha*, *Sheeta*, *Guru* and absorbefacient in nature.<sup>[5]</sup> *Acharya Charaka* has classified *Udumbara* under *Mutra Sangrahaniya Varga* and *Kashaya Skandha*. He mentioned this drug at 35 places in *Charaka Samhita*. *Acharya Sushruta* classified *Udumbara* in *Nyagrodhadigana* and mentioned this drug at eleven places whereas *Vagbhata* mentioned it at about sixteen places.<sup>[6,7]</sup> *F. glomerata* extracts have also been reported to possess significant medicinal and pharmacological properties like anti-microbial, anti-cancer and anti-oxidant activity.<sup>[8]</sup> It is believed that sacred fire produced by *Udumbara* wood generates prosperity, welfare, wealth, glory and energy.

The various parts of the plant showed good pharmacological actions and these are summarized as Anti inflammatory, Anti diabetic, antioxidant activity, hepatoprotective activity, antitussive, antiulcer activity, anti diarrhoeal effect, antidiuretic, anticancer effect, antibacterial activity, memory enhancing activity, hypolipidemic effect, Analgesic, Anthelmintic and wound healing.<sup>[9]</sup> Also used in production of RBC, Heart ailments, Prevent cramps, Enhance immunity and produces energy.

To justify the classical assessed *Mahabhautika* dominance in *Pugaphala* and *Udumbara Twak*, for the first time only two drugs *Pugaphala* and *Udumbara Twak* were scientifically evaluated by pharma-cognostical (Macroscopic and Microscopic) study. Ayurvedic properties of *Pugaphala* and *Udumbara Twak* are given in table 1.

**Table 1: Ayurvedic properties of *Pugaphala* and *Udumbara Twak*.**

Ayurvedic Properties	<i>Puga</i>	<i>Udumbara</i>
<i>Rasa</i>	<i>Kashaya</i>	<i>Kashaya</i> (bark), <i>Madhura</i> , <i>Kashaya</i> (fruit)
<i>Guna</i>	<i>Ruksha</i> , <i>Guru</i>	<i>Ruksha</i> , <i>Guru</i> , <i>Shushka</i>
<i>Veerya</i>	<i>Sheeta</i>	<i>Sheeta</i>
<i>Vipaka</i>	<i>Katu</i>	<i>Katu</i> (bark), <i>Madhura</i> (fruit)

#### AIMS AND OBJECTIVES

1. Assessment of *Mahabhautika* dominance in *Pugaphala* and *Udumbara Twak* through classics of Ayurveda.
2. Comparative assessment of *Mahabhautika* dominance in *Pugaphala* and *Udumbara Twak* by pharmacognostical study.

## MATERIALS AND METHODS

### Collection of Raw drugs

Raw drugs were collected from the pharmacy department, I.P.G.T. & R.A., Gujarat Ayurveda University, Jamnagar. The botanical name & part used are given in table 2.

**Table 2: Botanical Name & Part Used.**

Sanskrit Name	Botanical name	Part used
<i>Puga</i>	<i>Areca catechu</i>	Fruit
<i>Udumbara</i>	<i>Ficus glomerata</i>	Bark

### Pharmacognostical evaluation

The raw drugs were identified and authenticated by the Pharmacognosy laboratory, I.P.G.T. & R.A., Gujarat Ayurved University, Jamnagar. The identification was carried out based on morphological features, organoleptic characters and powder microscopy of both the drugs.

The initial purpose of study was to confirm the authenticity of both the drugs. First studied the dried powder under the Carl Zeiss Trinocular microscope attached with camera with and without staining. Microphotographs were also taken under the microscope.<sup>[10]</sup>

## OBSERVATIONS AND RESULTS

### Pharmacognostical Evaluation

#### Organoleptic characters

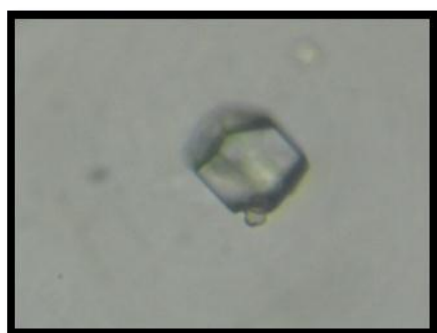
The colour, odour, taste etc. of the powders were recorded and placed in Table 3.

**Table 3: Organoleptic Features of *Pugaphala* and *Udumbara Twak* Powder.**

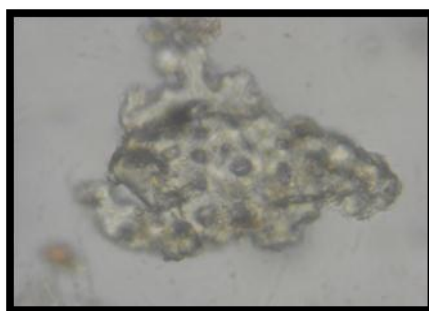
Drug	Colour	Odour	Taste	Touch
<i>Pugaphala</i>	Brown	Characteristic	Astringent	Fine course powder
<i>Udumbara Twak</i>	Chocolate Brown	Slightly Aromatic	Astringent	Course fine

#### Microscopic Evaluation of *Pugaphala* and *Udumbara Twaka* powder

The diagnostic characters observed in *Pugaphala* under the microscope are Rhomboidal crystal, Epicarp cells, Iodine stained Simple Starch grain, Starch grain with hilum, Bordered pitted vessels, Group of Simple fiber, Bright yellowish content, Brown content, Oil globule, Lignified scleroids, Parenchyma cells with starch grain and Parenchyma cells (Microphotographs Plate 1. 1-12).

Plate 1. Microscopic characters of *Pugaphala Churna*.

1. Rhomboidal crystal



2. Epicarp cell



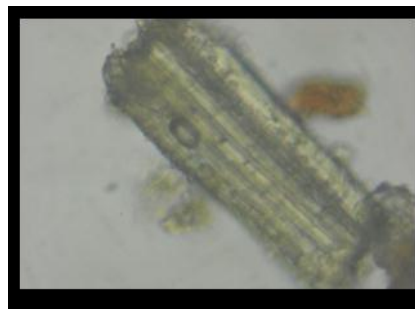
3. Iodine stained Simple Starch grain



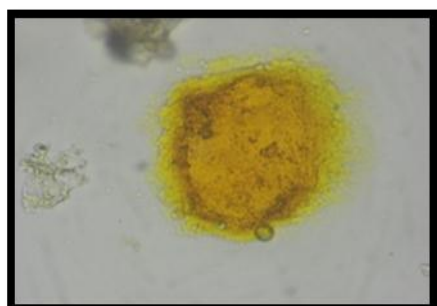
4. Starch grain with hilum



5. Bordered pitted vessel



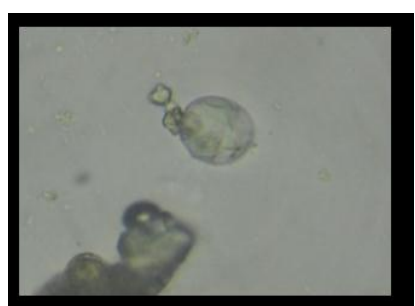
6. Group of Simple fiber



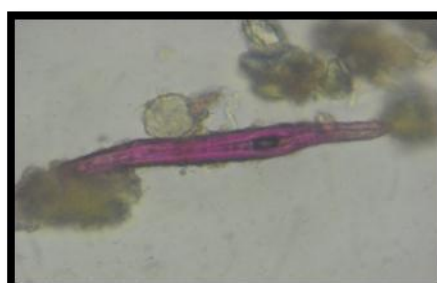
7. Bright yellowish content



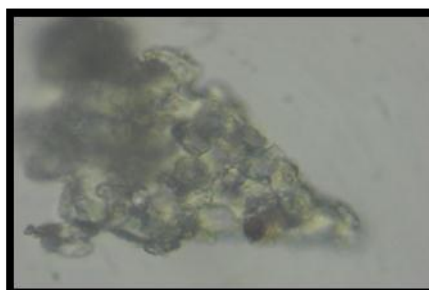
8. Brown content



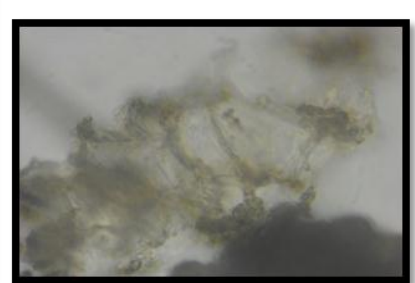
9. Oil globule



10. Lignified scleroid



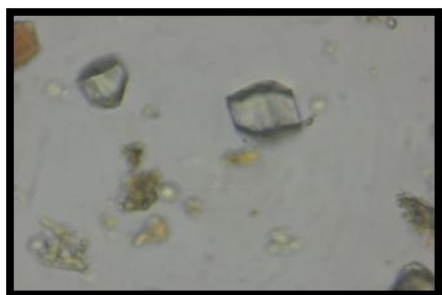
11. Parenchyma cells with starch grain



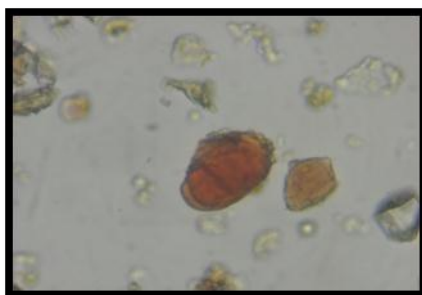
12. Parenchyma cells

And the diagnostic characters observed in *Udumbara Twaka* under the microscope are Rhomboidal crystal, Tannin content, Simple fibers, Cluster crystal, Cork in surface, Cork in tangential view, Crystal fiber, Fragment of cystolith, Pitted stone cell, Prismatic crystal, Lignified fibers, Lignified stone cell and Simple starch grains (Microphotographs Plate 2. 1-13).

Plate 2: Microphotographs of *Udumbara Twaka Churna*



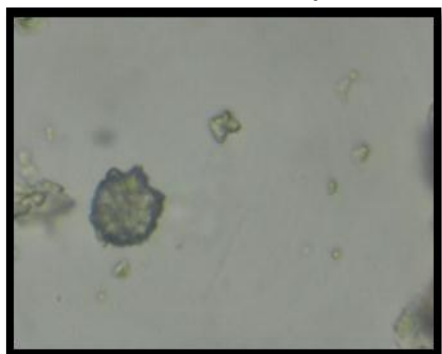
1. Rhomboidal crystal



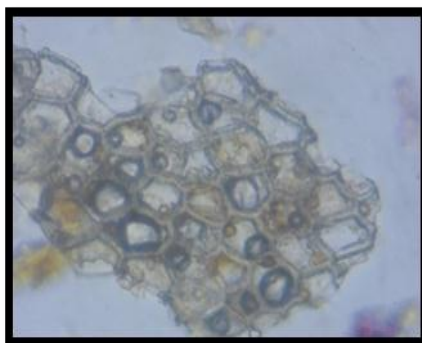
2. Tannin content



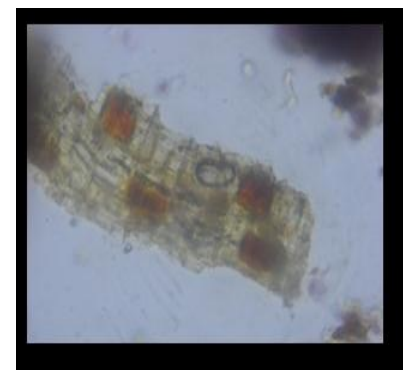
3. Simple fiber



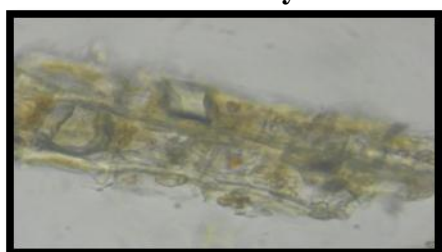
4. Cluster crystal



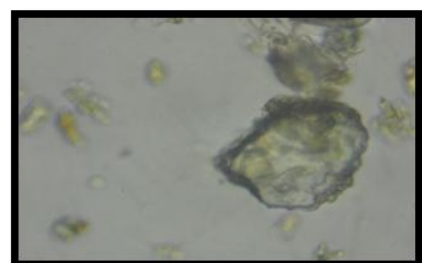
5. Cork in surface view



6. Cork in tangential view



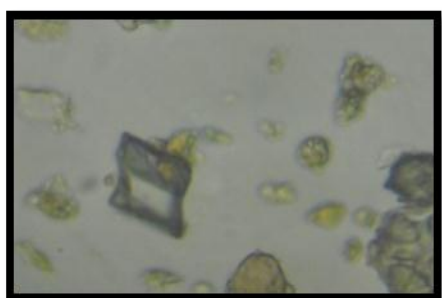
7. Crystal fiber



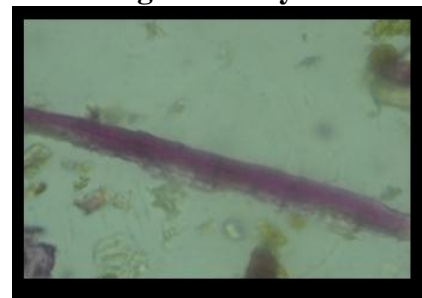
8. Fragment of cystolith



9. Pitted stone cell



10. Prismatic crystal



11. Lignified fibres



12. Lignified stone cell



13. Simple starch grains.

## DISCUSSION

*Acharya Charaka, Sushruta* and *Vagbhatta* all had described the properties of *Pancha Bhautika Dravyas* by their *Guna* (quality) and *Karma* (function) out of them the *Dravyas* (drugs), which are predominant in properties of *Guru* (Heavy), *Sthoola* (Bulkiness), *Kathina* (Hard), *Sthira* (Stable), *Sandra* (Solid), *Khara* (Roughness), *Vishada* (Non-slimy) etc. are *Parthiva* in *Mahabhautika* dominancy. They exert actions like *Upachaya* (Anabolism), *Gaurava* (Heaviness), *Sanghaata* (Cluster) and *Sthairya* (Stability).<sup>[11,12]</sup> *Acharya Sushruta* also described that *Parthiva Dravyas* are mostly *Madhura* (Sweet) and *Kashaya* (Astringent) in *Rasa* (Taste) and are having downward movement instinctively due to their heaviness.<sup>[13]</sup> *Ayurveda Sutra* also mentioned that *Kashaya Rasa* is originates from *Prithvi Mahabhuta*.<sup>[14]</sup>

*Pugaphala* and *Udumbara Twak* are also possesses *Kashaya Rasa, Guru, Ruksha Guna* and *Sheeta Veerya*.<sup>[15,16]</sup> So, by seeing their *Rasa Panchaka, Pugaphala* and *Udumbara Twak* were selected as *Parthiva* dominant *Dravyas* and after that, pharmacognostical study was also supported the *Prithvi* dominance of *Pugaphala* and *Udumbara Twak*. In powder microscopy of *Pugaphala* and *Udumbara Twak*, there are many structures which are hard, dense, stable, gritty, compactly packed and gives physical strength like in *Pugaphala* Rhomboidal crystal, Epicarp cells, Iodine stained Simple Starch grain, Starch grain with hilum, Group of Simple fiber, Lignified scleroid, etc. and in *Udumbara Twak* are Rhomboidal crystal, Cluster crystal, Crystal fiber, Fragment of cystolith, Pitted stone cell, Prismatic crystal, Lignified fibers, Lignified stone cell etc. these characters are strongly dominated by *Prithvi Mahabhuta*.

By seeing these characters in *Pugaphala* and *Udumbara Twak*, the dominancy of *Prithvi Mahabhuta* in both the drugs were confirmed. And *Udumbara Twak* possess more hard, dense, stable characters than *Pugaphala* so, dominancy of *Prithvi Mahabhuta* in *Udumbara Twak* was evaluated more as compared to *Pugaphala*.

Sclereids are a reduced form of sclerenchyma cells with highly thickened, lignified cellular walls that form small bundles of durable layers of tissue in most plants. The presence of numerous sclereids produces the gritty texture.<sup>[17]</sup> Sclereids are roughly iso-diametric, and clumps of these “stone cells” give its distinctive grittiness. Epicarp is a botanical term for the outermost layer of the pericarp (or fruit). The epicarp forms the tough outer skin of the fruit.<sup>[18]</sup>

Stone cells (called stone cells because of their hardness) giving rise to a gritty texture. Stone cells solidify tissues.<sup>[19]</sup> Stone cells are a type of sclereid with a thick secondary wall and an irregular shape. Sclereids originate from parenchyma cells by continued thickening and lignifications of the wall. Cork cells usually formed from Phellogen. Cork cells are usually tightly packed, dead and filled with air.<sup>[20]</sup>

These all features found in powder microscopy of *Pugaphala* and *Udumbara Twak* can be correlated with *Kathina* (Hard), *Sthira* (Stable), *Khara* (Rough), *Vishada* (Non-slimy), *Murta* (Shape) and *Sthoola Swaroop* (Bulky nature) of *Prithvi Mahabhuta*.

## CONCLUSION

Pharmacognostical analysis (Macroscopic and Microscopic) of *Pugaphala* and *Udumbara Twak* showed the specific characters which are hard and dense in nature, compactly arranged and gives hard texture to the compound thus confirm the dominance of *Prithvi Mahabhuta* in *Pugaphala* and *Udumbara Twak* both, and also confirm that *Udumbara Twak* has more *Parthiva* dominance due to presence of more hard, dense, stable, gritty texture structures as compared to *Pugaphala*. The compactness and density (*Kathinya*) in any material form (*Murti*), obtained due to the generic principle *Prithvi*. Thus, *Prithvi Mahabhuta* is responsible for giving structure, shape, stability, hardness, bulkiness and strength by their *Sthoola* (Bulky), *Sthira* (Stable), *Kathina* (Hard), *Sandra* (Solid), *Guru* (Heavy), *Khara* (Rough) etc *Guna* (quality). These *Gunas* were also assessed scientifically in *Pugaphala* and *Udumbara Twak* by Pharmacognostical study based on morphological features, organoleptic characters and powder microscopy of both the drugs. The present study could be used as a scientific tool for further detailed analysis to standardize the crude drugs.

## ACKNOWLEDGEMENT

The authors thanks to I.P.G.T & R.A, Gujrat Ayurved University, Jamnagar for their financial support.

**CONFLICT OF INTREST:** None declared.

## REFERENCES

1. Naagarajan, R. and Meenakshi, R. Analysis of Areca nut production and export in India. *Internat. J. Appl. Soc. Sci.*, 2016; 3(3 & 4): 67-81.
2. The *Atharveveda* and *Ayurveda*; Kum. Usha Karambelkar, Nagpur-2, India, 1961.



3. Amudhan MS, Begum VH, Hebbar KB. A review on phytochemical and pharmacological potential of areca catechu L. seed. *Int J Pharm Sci Res.*, 2012; 3: 4151-7.
4. Agnivesha: *Charaka samhita*, revised by Charaka and Dridhabal, with commentary of Chakrapanidatta, edited by jadavji trikamji acharya, chaukhambha Sanskrit Sansthana, Varanasi, Sutra Sthana, Chapter 27, verse 128. Reprint, 2015; 160.
5. Vagbhata: “*Astanga Hridayam*”, with commentary of Arunadatta and Hemadri, Edited by Pt. Hari Sadashiva Shastri. Varanasi: Chaukhambha Sanskrit Sansthan. Sharira Sthana, Chapter 6, verse 92, reprint, 2014; 105.
6. *Ashtang Hridaya* (with *Vidyot ini* Hindi Commentary); by Atridev Gupta, 11<sup>th</sup> Ed. Chowkhambha Sanskrit Sansthan; Varanasi, India, 1951.
7. *Sushruta Samhita*; 9<sup>th</sup> Ed; (with *Ayurveda Tattva Sandipika*, by Shastri, Ambikadutta Hindi Commentary) Chowkhambha Sanskrit Sansthana; Varanasi-I, India, 1995.
8. Joseph, B. & Raj, S.J. Phyto-pharmacological and phytochemical properties of three Ficus species– an overview. *Int. J. Pharma & BioSci.*, 2010; 1(4): 246-253.
9. Yadav RK, Nandy BC, Maity S, Sarkar S, Saha S. phytochemistry, pharmacology, toxicology and clinical trial of *Ficus racemosa*. *Pharmacogn Rev.*, 2015; 17: 73-80.
10. Kokate CK, Purohit AP, Gokhale SB. *Analytical Pharmacognosy*. 42<sup>nd</sup> ed. Pune: Nirali Prakashan, 2008.
11. *Charaka samhita*, revised by charak and Dridhabal, with commentary of chakrapanidatta, edited by jadavji trikamji acharya, chaukhambha Sanskrit Sansthana, Varanasi, Sutra Sthana, Chapter 26, verse 11, Reprint, 2015; 138.
12. *Astanga Hridayam*, with commentary of Arunadatta and Hemadri, Edited by Pt. Hari Sadashiva Shastri. Varanasi: Chaukhambha Sanskrit Sansthan. Sutra Sthana, Chapter 9, verse 5, reprint, 2014; 166.
13. *Sushruta Samhita* with commentary of Dalhana, edited by vaidya jadavji Trikamji Acharya, Chaukhambha Surbharti Prakashan, Varanasi 8th edition, Sutra Sthana, chapter 41, verse 4, Reprint, 2014; 181.
14. *Ayurveda Sutram Sabhashyam*, by Yoganandnath, 8/3.
15. *Bhavprakash Nighantu, Amraphalaadi Varga* 7/42-44
16. *Kaiyadeva Nighantu, Aushadhi Varga*, verse 1/514-521.
17. Sclereids- <https://en.m.wikipedia.org>
18. Fruit anatomy- <https://en.m.wikipedia.org>
19. The Great Soviet Encyclopedia, 3<sup>rd</sup> Edi (1970-1979).
20. Cork-cells- <https://www.microscopyu.com>