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ESTABLISHMENT OF QUALITY STANDARDS FOR SHYONAK: AN IMPORTANT INGREDIENT OF THE DASHMOOLA GROUP OF DRUGS

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ABSTRACT: Shyonak is botanically equated to *Oroxylum indicum* (L.) Kurz. of family *Bignoniaceae*. It is extensively used in the Indian system of medicine as an important ingredient of ‘Dashmoola and also one of the important constituents of a reputed Ayurvedic formulation ‘Chyavanprash’. The drug consists of root bark of *Oroxylum indicum* (L.) Kurz. Ayurvedic Pharmacopoeia of India (API) advocates that the stem bark can be used in case of the non-availability of the root bark. The root and stem bark is used for the treatments of diarrhoea, dysentery, erythema, gastralgia, hoarseness, infantile, measles, sore throat, urticaria, snake-bite and scorpion-sting. During the market survey it was found that the stem bark of *Ailanthus excelsa* Roxb. (Family- Simarubaceae) is being sold in the name of Shyonak as an adulterant. Considering these points, an attempt has been made to identify and to establish quality standards for both root bark and stem bark of Shyonaka (*Oroxylum indicum* (L.) Kurz. along with stem bark of *Ailanthus excelsa* Roxb. HPTLC fingerprint profiles showed similar and differentiating bands. Five common bands at R_f 0.62, 0.64, 0.79, 0.84, and 0.96 under UV 366 nm were present in the root bark and stem bark of *O. indicum*, except an additional band in the root bark at R_f 0.56 while the band pattern is totally different in the stem bark of *A. excelsa* having additional band at different R_f s.

INTRODUCTION: According to Ayurvedic literature, ‘Shyonak’ comes under Brihat panchmoola (Group of Five root drugs of Tree Species) of Dashmoola (Decoction of ten root drugs) group of drugs¹.

It is an active ingredient of well-known Ayurvedic formulations like Amartarista, Awalwha, Brahma Rasayana, Bruhat Pancha, Chyawanaprasha, Dantyardarishta, Dasamoola, Dhanawantara ghrita, Mulayadi kwath, Narayana taila, and Shyonaka patpak.

The root bark of *Oroxylum indicum* (L.) Benth. Ex. Kurz (Family: *Bignoniaceae*) is an official drug attributed to Shyonak^{2, 3, 4, 5}. It is also known as Broken bones tree, Indian trumpet flower, Midnight horror, Shivnak, Sonapatha, and Arul⁶. The tree is a night-bloomer and flowers are adapted to natural

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pollination by bats. *O. indicum* is being used as medicinal herb for thousands of years without any known adverse effects⁷. The plant is native to the Indian subcontinent with extended distribution to southeast and south Asian countries⁸. In India, it grows in Himalayan foothills, Eastern and Western Ghats⁹ and due to the resemblance of its flowers to the trumpet, it is called 'Trumpet tree'. The root bark is astringent, bitter and useful in curing cough, fever, diarrhoea, anorexia, dropsy, troubles of bile, and rheumatism^{1, 10, 11}. The phytochemical investigations of the different parts viz. root, stem, leaf, and the seed of the *O. indicum* revealed the presence of approximately 111 compounds, among which flavonoids are the most abundant.

Further, each plant part, such as root bark, stem bark, leaves, fruits and seeds of *O. indicum* has high medicinal value. The drug has been scientifically validated for many certain pharmacological activities, namely diuretic, antimutagenic, antimicrobial, anticancer, antiulcer, wound healing, antitumorigenic, hepatoprotective anti-inflammatory, anti-oxidant, antiarthritic, immunostimulant, protective effect against acute colitis^{7, 11, 12}. Owing to the indiscriminate collection, over exploitation and uprooting of whole plants bearing roots, this valuable tree has become vulnerable in Karnataka and Andhra Pradesh and endangered in Kerala, Maharashtra, M.P. and Chhatisgarh^{13, 14} and is feared to become endangered soon in other states too.

It is reported in the classical text of Ayurveda that the properties of the main useful part of the plant are the same with other parts of the same plant. Ayurvedic Pharmacopoeia of India (API) advocates that the stem bark of *O. indicum* can be used in place of root bark².

Due to the unavailability of the official drug, the stem bark of *O. indicum* commonly sold in Indian drug markets under the vernacular name Shyonak or Arul but another species *A. excelsa* (stem bark) is also being sold as Shyonak or Arul. Hence, in order to ensure the quality of its supply, especially in the times of adulteration and substitution prevailing on the crude drug markets of India, the present communication deals with detailed quality control parameters viz. macro-microscopic description, physicochemical parameters, and thin

layer chromatographic profiles of the root bark, stem bark of *O. indicum*, along with their possible adulterant i.e. stem bark of *A. excelsa* collected from Chitrakoot (MP) and Lucknow (UP) of India.

MATERIALS AND METHODS:

Plant Material¹⁵: The root bark, stem bark of *Oroxylum indicum*, and stem bark of *Ailanthus excelsa* Roxb. were collected from Chitrakoot (Madhya Pradesh) and Lucknow (UP), India, respectively. These were identified and authenticated taxonomically at National Botanical Research Institute, Lucknow, India. A voucher specimen no (GGDCK/Bot/003) was deposited in the Institutional herbarium for future reference. The plant materials were shade dried and size reduced and stored until further use in an air-tight container. Fresh plant material was obtained for macroscopical and microscopical evaluation.

Chemicals: All chemicals used were of analytical grade from MERCK and SD Fine chemicals Ltd. We thank full to director of NBRI for providing chemical and all facilities to complete the research work.

Macroscopic and Microscopic Analysis: For microscopic studies, transverse sections (TS) and longitudinal sections (LS) were prepared and stained¹⁶.

Samples were dried at 50 °C in a hot air oven, stored at 25 °C in an airtight container. Root bark and stem bark of all samples were powdered and sieved through 85 mesh. A small quantity of powdered material was washed with water to remove sugar and then cleared by heating gently with saturated chloral hydrate solution, cooled, and mounted in glycerin for microscopic observation.

Physicochemical Analysis^{17, 18, 19}: The air-dried plant material was used for the quantitative determination of physicochemical parameters such as the percentage of total ash, acid insoluble ash, water, and alcohol-soluble extractives were calculated according to methods described in the Indian Pharmacopoeia and. The percentage of sugar, starch and tannins were also calculated by means of a spectrophotometer.

TLC Fingerprinting: 1 g of powdered root bark was refluxed for 5 min on a water bath with 5 ml

methanol, filtered and the filtrate taken as a test solution and was then applied on HPTLC pre-coated silica gel G60 F254 Merck percolated aluminium sheet of 5 × 10 cm with the help of a Camag Linomat-IV applicator and the plate eluted to a distance of 8.0 cm at room temperature (25 °C) in a solvent system of Toluene, Ethyl acetate and Acetic acid (5:5:0.1).

RESULTS AND DISCUSSION:

Macroscopic Characters and Organoleptic

Evaluation: The root bark and stem bark of two different species attributed to 'Shyonak' have been studied and these can be differentiated on the basis of macro-microscopic characters. The comparative results have been tabulated in Fig. 1, Table 1.



FIG. 1: MACROSCOPY OF 'SHYONAK' (A- *O. INDICUM* TREE, B- *A. EXCELSA* TREE, C- *O. INDICUM* ROOT BARK, D- *O. INDICUM* STEM BARK, E- *A. EXCELSA* STEM BARK)

Microscopic Characters: Histologically, both the species of *O. indicum* and *A. sexcelsa* can be differentiated on the basis of cork cells, stone cells and medullary rays. The Cork layer varies in size or collapsed in root bark of *O. indicum* with 700 to 1000 µm thick and 400 µm in stem bark of *O.*

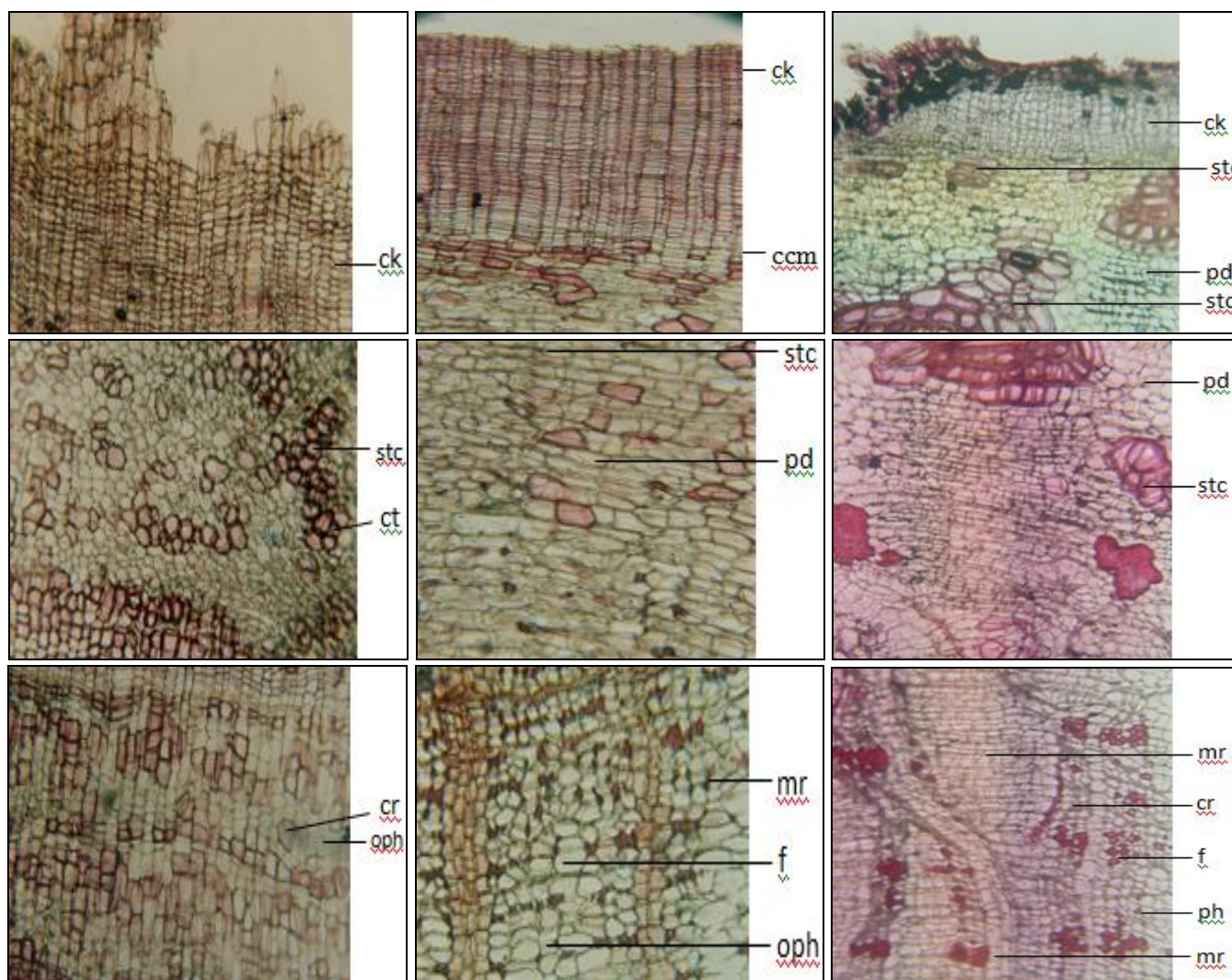
indicum having 2-3 layered cork cells interrupted with stone cells. The *A. excelsa* is composed of broader phelloderm (2/3rd section occupied by secondary phloem) in comparison to that of *O. indicum*. Group of Stone cells of the broad lumen and narrow boundaries are present in cork and

phelloderm region of *O. indicum* while phellogen only in *A. excelsa* with the narrow lumen and broad boundaries. Phloem fibers are present solitary or in small groups usually arranged in regular tangential bowls in the inner phelloderm of *A. excelsa* having

very peculiar characteristic funnel-shaped multicellular, multiseriate, heterogeneous medullary rays. Broadness of medullary rays also varies: 2-3 or 3-5 seriate in the root bark and stem bark of *O. indicum* respectively **Fig. 2, 3.**

TABLE 1: COMPARATIVE DISTINGUISHING CHARACTERS OF POSSIBLE ADULTERANTS/ SUBSTITUTES OF SHYONAK

S. no	Character	Root bark of <i>O. indicum</i>	Stem bark of <i>O. indicum</i>	Stem bark of <i>A. excelsa</i>
1.	Macroscopy		Macroscopy	
	Size	0.5-1.0 cm thick	Size	0.5-1.0 cm thick
	Outer Surface	Yellowish-brown, smooth with longitudinal striations	Outer Surface	Yellowish-brown, smooth with longitudinal striations
	Inner Surface	Smooth	Inner Surface	Smooth
2	Fracture	Soft and splintery	Fracture	Soft and splintery
	Powder		Powder	
	Colour	Brownish cream	Colour	Brownish cream
	Taste	Sweet and mucilaginous	Taste	Sweet and mucilaginous
	Odour	Characteristic	Odour	Characteristic
	HPTLC of Methnolic Extract	Black Spots at Rfs 0.56, 0.62, 0.64, 0.79, 0.84, and 0.96	HPTLC of Methnolic Extract	Black Spots at Rfs 0.56, 0.62, 0.64, 0.79, 0.84, and 0.96



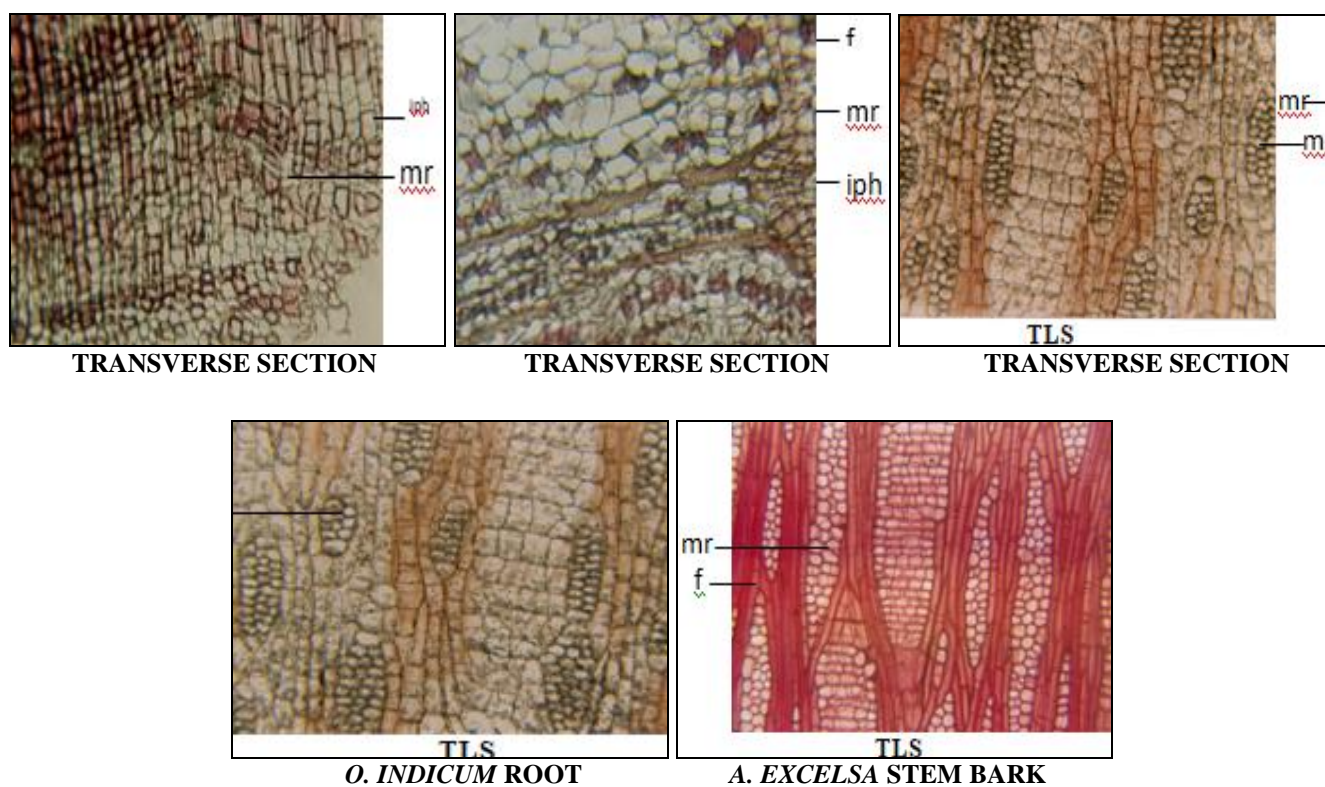


FIG. 2: MICROSCOPY OF SHYONAK [CCM, CORK CAMBIUM; CK, CORK; CR, CRYSTAL FIBER; CT,

TABLE 2: PHYSICOCHEMICAL PARAMETERS OF SHYONAK

Parameters	Root bark of <i>O. indicum</i>	Stem bark of <i>O. indicum</i>	Stem bark of <i>A. excelsa</i>
Total Ash	14.68	15.06	10.55
Acid Insoluble Ash	5.5	7.16	4.5
Water Soluble extractives	12.16	16.33	14.34
Alcohol soluble extractives	6.25	9.74	10.67
Total Sugars	1.95	2.32	0.73
Starch	20.25	28.11	22.12
Tannin	4.72	5.32	3.44

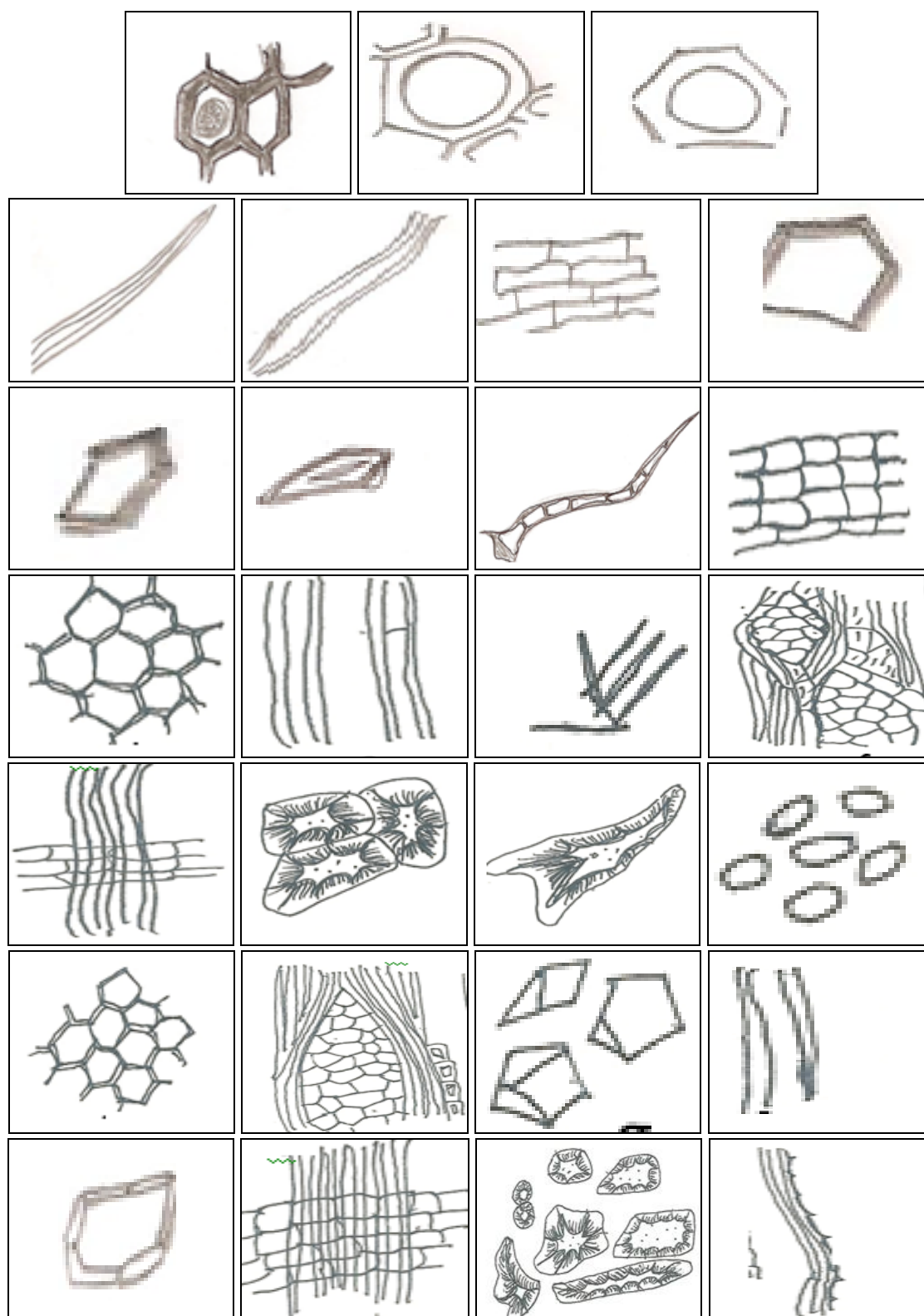
TABLE 3: RF VALUES OF SHYONAK

S. no.	Root bark of <i>O. indicum</i>		Stem bark of <i>O. indicum</i>		Stem bark of <i>A. excelsa</i>	
	R _f Values	Colour	R _f Values	Colour	R _f Values	Colour
1	0.56	Black	-	-	0.35	Black
2	0.62	Black	0.62	Black	0.40	Black
3	0.64	Black	0.64	Black	0.49	Blue
4	0.79	Black	0.79	Black	0.56	Black
5	0.84	Black	0.84	Black	0.65	Black
6	0.96	Black	0.96	Black	0.73	Black
7	-	-	-	-	0.79	Black
8	-	-	-	-	0.82	Black
9	-	-	-	-	0.92	Black
10	-	-	-	-	0.96	Black

Physicochemical Evaluation: Under physicochemical values, total ash, acid insoluble ash, tannins and total sugars were found almost lower range in *A. excelsa* compared to *O. indicum* Table 2.

HPTLC Profile: HPTLC fingerprint profiles Table 3, Fig. 4. also showed similar and

differentiating bands. Five common bands at R_f 0.62, 0.64, 0.79, 0.84 and 0.96 under UV 254 nm were present in the root bark and stem bark of *O. indicum*, except an additional band in the root bark at R_f 0.56 while the band pattern is totally different in the stem bark of *A. excelsa* having an additional band at different R_fs.



O. INDICUM ROOT BARK (A) O. INDICUM STEM BARK (B) A. EXCELSA STEM BARK (C)

FIG. 3: POWDER MICROSCOPY OF SHYONAK A. A,B,C,D STONE CELLS; E, PHLOEM FIBER; F, XYLEM FIBER; G, CORK CELLS; H, I, J, CRYSTALS; K, MULTICELLULAR HAIRS; B. A, CORK CELLS IN TRANSVERSE VIEW; B, CORK CELLS IN SURFACE VIEW; C, ACICULAR CRYSTALS OF CALCIUM OXALATE; D, STONE CELLS; E, SEPTATE AND NON-SEPTATE FIBRES; F, TANGENTIALLY CUT MEDULLARY RAY; G, RADIALY CUT MEDULLARY RAYS; C. A, CORK CELLS IN SURFACE VIEW; B, STONE CELLS; C, TRANSVERSELY CUT MEDULLARY RAY; D, FIBRES; E, RADIALY CUT MEDULLARY RAY; F, STARCH GRAINS; G, PRISMATIC CRYSTALS OF CALCIUM OXALATE

TABLE 3: RF VALUES OF SHYONAK

S. no	Root bark of <i>O. indicum</i>		Stem bark of <i>O. indicum</i>		Stem bark of <i>A. excelsa</i>	
	Rf Values	Colour	Rf Values	Colour	Rf Values	Colour
1	0.56	Black	-	-	0.35	Black
2	0.62	Black	0.62	Black	0.40	Black
3	0.64	Black	0.64	Black	0.49	Blue
4	0.79	Black	0.79	Black	0.56	Black
5	0.84	Black	0.84	Black	0.65	Black
6	0.96	Black	0.96	Black	0.73	Black
7	-	-	-	-	0.79	Black
8	-	-	-	-	0.82	Black
9	-	-	-	-	0.92	Black
10	-	-	-	-	0.96	Black

CONCLUSION: Ayurvedic herbs and their products have been used successfully for thousands of years. The quality control parameters, analytical techniques for identity, purity, and strength are the key point of herbal monographs and pharmacopoeia. The pharmaceutically developed products or any herbal formulation should meet the requirements of the monograph or pharmacopoeia for the efficacy. Quality herbal products can be developed only using scientifically standardized raw materials. *O. indicum* is considered a genuine or official drug as Shyonak in Ayurveda. However, some other plant species or other parts are also used by their trade name.

The quality control and pharmacognostical parameters can be useful to identify and distinguish other substitutes and adulterants of the drug Shyonak. All three samples used or sold as 'Shyonak' can easily be differentiated based on their morphological, microscopical, and chromatographic profile.

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REFERENCES:

- Anonymous: The wealth of india, a dictionary of indian raw materials and industrial products, publications and information directorate. CSIR New Delhi India 1995; 351.
- Anonymous: The ayurvedic pharmacopoeia of india, govt. of india, industry of health and family welfare department of indian system of medicine and homoeopathy, New Delhi India 1998; 209-10
- Warrier PK, Nambiar VPK and Ganapathy PM: Some important medicinal plants of the Western Ghats, India- A profile; IDRC/SARCO Publication. New Delhi 2001; 9-32
- Singh AK: Morphological expression in seedling of *Oroxylum indicum* Vent. A well known medicinal tree of tropics and sub tropics. Modern Phytomo 2015; 8: 41-48.
- Radhika LG, Meena CV, Peter S, Rajesh K and Rosamma MP: Phytochemical and antimicrobial study of *Oroxylum indicum*. Ancient Science of Life 2011; 30(4): 114-20.
- Kirtikar KR and Basu BD: Indian medicinal plants; 2nd edition vol. 3, bishen singh, mahendra pal singh. Dehradun 1981; 1838-41.
- Ahad A, Ganai AA, Sareer O, Najm MZ, Kausar MA, Mohd M and Siddiqui WA: Therapeutic potential of *Oroxylum indicum*: a review. Journal of Pharmaceutical Research and Opinion 2012; 10: 163-72.
- Theobald WL: Bignoniaceae, In: Dassanayake, MD, Fosberg FR (Eds), Arevised handbook to the Flora of Ceylon, Amerind publishing Co. Pvt Ltd New Delhi India 1981.
- Sasidharan N: Biodiversity documentation for Kerala- Flowering plants. Forest iResearch Insttute Peechi Kerala India 2004; 6: 321-24
- Chopra RN, Nayar SL and Chopra IC: Glossary of indian medicinal plants. National Institute of Science Communication and Information Resources New Delhi 2002; 182.
- Dinda B, Slsarma I and Rudrapaul P: *Oroxylum indicum* (L.) Kurz., an important Asian traditional medicine: From traditional uses to scientific data for its commercial exploitation. Journal of Ethnopharmacology 2015; 161: 255-78.
- Kumar SK and Yadav DK: Pharmacognostical and physicochemical standardization of *Oroxylum indicum* vent. Root Bark International Journal of Pharmacognosy 2015; 2(6).
- Kumar RK and Ved DK: Red listed medicinal plants for conservation concern in Southern India. Foundation of Revitalization of local health traditions, Bangalore, India. 2000; 1-467
- Joshi KK and Joshi SD: Genetic heritage of medicinal and aromatic plants of nepal himalayas. Kathmandu. Nepal Buddha Academic Publishers and Distributors Pvt Ltd 2001.
- Jain SK and Rao RR: Hand book of field and herbarium methods. Today and Tomorrow's Printers and Publishers New Delhi 1976.
- Johanson DA: Plant microtechnique, 1st edition., mc graw hill book c. Inc New York 1940.
- WHO/QCMMPM. Quality control methods for medicinal plant material. Organization Mondiale De La Sante Geneva 1992; 21-34
- Montgomery R: Determination of glycogen Archives of Biochemistry and Biophysics 1957; 67: 378-86.
- Anonymous: Official methods of analysis (AOAC), 14th ed. Association of Official Analytical Chemists Inc USA 1984.

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