

MACROSCOPIC AND MICROSCOPIC STUDY OF TERMINALIA ARJUNA SPECIES

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ABSTRACT

Arjuna is generally non-controversial drug. Arjuna has also mainly two varieties now a days i.e. *Terminalia arjuna* and *Terminalia tomentosa*. Among them, *Terminalia arjuna* is accepted all over as Arjuna. To authenticate that the stem bark which have been used in the study is original and not adulterated or confused with any other drug, pharmacognostic study is undertaken.

KEYWORDS: Trees, or shrubs often climbers, leaves alternate subopposite or opposite.

INTRODUCTION

Ayurveda considers life as “Nityaga”, which indicates that continuous changes are taking place in both Sarir (Dosa, Dhatu, Mala) and Manas (Satva, Raja, Tama). These changes both normal and abnormal as well, are resultant of the variations in the Gunas themselves that are due to continuous nature of changing.

Ayurveda, the knowledge of life sciences bestowed health & longevity in the form of preventive & curative measures. In Charak Sutrasthana 1/46 Acharya Charak said that the unique contribution of Ayurveda to the living being in general and human being in particular is its ultimate understanding of the living being (Purusa) in its totality as conglomeration of the Satva (mind), Atma (spirit) and Panchmahabhutatmaka Sarir (Body).

In Astang Ayurveda Health's preventive & curative properties are based on Dravya. That's why Dravya is mentioned in chikitsa chatuhsad. These Dravya's have several gunas, these gunas are responsible for karma. Guna & Karma both are complementary of each other. According to Ayurveda Guna is “Nischestyā” but Karma have “Chestyā” property. It means, karma directly represents the Gunas which are dependable in any substance / Dravya.

Arjuna is generally non-controversial drug. Arjuna has also mainly two varieties now a days i.e. *Terminalia arjuna* and *Terminalia tomentosa*. Among them, *Terminalia arjuna* is accepted all over as Arjuna. To authenticate that the stem bark which have been used in the study is original and not adulterated or confused with any other drug, pharmacognostic study is undertaken.

AIMS AND OBJECTIVES OF STUDY

1. To evaluate stem bark and powder of *Terminalia arjuna* for their organoleptic characters.
2. To study morphological features of stem bark of the drugs.
3. To study microscopic characters of stem bark of drugs.

OBSERVATION AND RESULTS OF ARJUNA

Organoleptic Study Arjuna

Organoleptic characters of stem bark and powder of *Terminalia arjuna* are tabulated below.

Sr.	Characters	Stem bark of <i>Terminalia arjuna</i>	Powder of <i>Terminalia arjuna</i>
1.	Taste	Kashaya, Bitter	Kashaya
2.	Colour	Pinkish	Pinkish white
3.	Odour	Nothing special (Nirgandh)	Nothing special (Nirgandh)
4.	Touch	Rough (Khara)	Rough (Khara)

Macroscopic study (*Terminalia arjuna*)Family – *Combretaceae*

Trees, or shrubs often climbers, leaves alternate subopposite or opposite, sometimes ternate, Petioled, entire, simple (in *Illigera* 3 foliolate), stipules O. Flowers bracteolate at base in the tribe *gyrocarpeae* cymose; in the *combretaceae* spicate or racemose (the racemus often paniced); not rarely polygamomnoecious. Calyx-tube adnate to the ovary and produced above it (sometimes to a great length), the limb of 4-7 valvate lobes. Petals 4-5 or 0 (Rarely 6-7). Stamens 4-5 or 8-10 on the calyx; in

the Gyrocarpeae the filaments have staminodes attached at the base and the anthers dehisce by recurved lateral valves. Ovary altogether inferior 1-celled; style- simple, stigma- simple or in Illigera sinuate almost lobed; ovule 1-7 (usually 2-3) Pendulous from the apex of the cell. Fruit coriaceous or drupaceous, generally indehiscent, ovate, angular or very commonly winged; in calycopteris and gyrocarpus crowned by the greatly enlarged calyx. Seed 1, without albumen; cotyledons in Terminalia and others convolute; in Combretum and others plano-convex.

Distribution

Species 240, in the tropics of the whole world; and in South Africa outside the tropic.

Terminalia Linn

Large trees. Leaves alternate or subopposite, exstipulate, entire or slightly crenulate, often with glands on the petiole or near the base of the mid rib beneath. Flowers small spicate, the racemes spikes sometimes paniced, hermaphrodite or the upper flower on the racemes males, a narrow bract at the base of each flower, soon deciduous. Calyx-tube produced above the ovary with a campanulate mouth, limb of 5 short valvate triangular lobes, deciduous. Petals 0. Stamens 10 inserted on the calyx-tube, epigynous disc with in them densely hairy. Ovary 1-celled, inferior, style long, simple, ovules 2 or 3, Pendulous from the summit of the cell. Fruit ovoid, very various in size, smooth or angular or winged with 2-5 wings, indehiscent, coriaceous. Seed solitary exalbuminous, cotyledons convolute-

Distribution: species 80; in the tropic of the whole world, less numerous in America.

Terminalia arjuna wight and arn.

Taxonomy: Terminalia arjuna (Roxb. Ex DC) Wight and Arn. Combretaceae.

Synonyms: Terminalia arjuna, Pentaptera arjuna, Pentaptera glabra, Pentaptera angustifolia.

Distribution: The tree is common throughout the greater part of the Indian Peninsula along rivers, streams, ravines and dry water-courses, reaching a large size on fertile, alluvial loam. It is rare in Karnataka, but is fairly plentiful in Tirunelveli and on the West coast. It extends North-wards to the sub-Himalayan tract, where it is distributed along the banks of streams; in Punjab, it is a cultivated tree. It is common in Chota Nagpur, Orissa and in the Northern Circars. It is extensively planted in India for shade or ornament in avenues or parks, even in dry and hot regions. In favourable localities, especially along the banks of streams, the tree attains very large size. Two trees, 8.6 m. and 10.6 m. in girth, have been recorded in Jammu [Kadambi, -Indian For., 1954, 80, 692; Troup, II, 530; Bor, 212; Chaturvedi, Indian Fmg, N.S., 1958-59, 8(1), 9].

Description: A large, evergreen tree, with a spreading crown and drooping branches, common in most parts of India and also planted in many parts for shade and ornament. Stems rarely long or straight, generally always buttressed and often fluted; bark very thick, gray or pinkish green, smooth, exfoliating in large, thin, irregular sheets; leaves sub-opposite, oblong or elliptic, coriaceous, usually 10-15 cm. long, occasionally 25 cm., cordate, shortly acute or obtuse at the apex; flowers in paniced spikes; fruits 2.5-5.0 cm. long, nearly glabrous, ovoid or ovoid-oblong, with 5-7 hard, winged angles.

Terminalia tomentosa wight and arn.

English name: Indian Laurel

Synonyms: Terminalia alata, Terminalia elliptica, Terminalia tomentosa

Family: Combretaceae

Distribution: Widely distributed in India and Burma. The Tree May reach a height of 100 ft and more; with clear, straight boles to 70 ft; trunk diameters about 3 ft.

Morphology of Arjuna: It is a large ever green tree, attains 60-80ft. with huge often buttressed trunk and horizontally spreading or drooping branches.

Bark: Smooth, grey outside, flesh coloured inside flaking off in large flat thin pieces. Heart wood dark brown, very hard, variegated with dark coloured streaks. Stem rarely long or straight, often fluted.

Leaves: Simple usually sub opposite hard 10/15/4-7 cm. oblong or elliptic oblong, obtuse or subacute coriaceous, sometimes spatulate, pale dull green above, pale brown beneath, shallowly crenate, serrate in the upper part or some times throught out. Base rounded to cordate, main nerves arcuate, 10 to 15 pairs. Shortly acute or obtuse at the apex, blade 3-6, often unequal sided, main nerves arcuate, 10-15 pairs, veins reticulate, pellucid. Petioles - 6-10mm long, often very short with one or usually two prominent glands at the top immediately below the leaves.

Flower: Sessile, white in short axillary spikes or in terminal panicles.

Bracteoles - Linear-Lanceolate, shorter than the flowers, cauducous.

Calyx - Glabrous, teeth, triangular, nearly glabrous both within and without.

Ovary - Quite glabrous, disk clothed with yellowish or reddish hairs.

Young ovary -very short, covered with crisped brown or rufous hair.

Drupe - 2.5cm, ovoid or obovoid - oblong, fibrous-woody, glabrous, dark brown with 5-7 hard projecting wings striated with numerous curved wings.

Wings of the fruite usually truncate or suddenly narrowed at the top.

Sapwood-Reddish white.

Distribution: Throughout the greater part of India. In the sub-Himalayan tract of the North west region, common on the banks of rivers, streams and dry water courses in Central India and South Bihar, Chota Nagpur, parts of Bombay and Madras.

By the passage of the time, the Latin Name of Arjuna has changed with the advancement in Taxonomy

1814: Roxberghian named it as *Pentaptera angustifolia*

1841: Hord called it as *Pentaptera glabra*.

1843: Finally Wight and Arnott, called it *Terminalia arjuna*, W & A which is still continuing.

Latin Name: *Terminalia Arjuna*, W & A.

Family: Combretaceae.

Macroscopic characters

The samples were authenticated pharmacognostically with the help of macroscopic and microscopic characters. General conditions of the drug, size, shape, surfaces are noted.

Macroscopic characters

Parameters	<i>Terminalia arjuna</i>	<i>Terminalia tomentosa</i>
Size	Varying size up to 10-15 cm in length, 4-8 cm width and 0.5-2 cm in thickness	Varying size up to 30 cm in length, 4-8 cm width and 2-3 cm in thickness
Shape	Flat	Flat
Surfaces	Outer surface is pinkish in colour and smooth. Internal surface is finely striated and having light colour	The outer part of the bark consist of rhytidoma about 1 cm thick. The outer surface is rough showing many crack and fissures. The inner surface is dark brown, smooth and longitudinally striated
Fracture	Short in internal and laminated in external part	Granular

Microscopic Character

Microscopic study of the drug provides diagnostic characters. Under the microscopic study Transverse section was studied different varieties of Arjuna..

Transverse section of *Terminalia arjuna*

- Cork consisting of 9-10 layers of tangentially elongated cells.
- Cortex regions consist of wide parenchymatous cells filled with brown colouring matter and Rosette crystals of calcium oxalate, simple and compound starch grains scattered as such throughout this region.
- Secondary phloem occupies with phloem parenchyma, phloem fibres, mucilage cells, Rosette crystals of calcium oxalate, simple and compound starch grains and traversed by medullary rays, usually uniseriate but biseriate rays also occasionally seen. Schlerenchymatous fibres are also present in phloem region.

Transverse section of *Terminalia tomentosa*

- Cork is multilayer made up of 25-30 layers of rectangular shape cork cells. Cork cells are of two types, one is broad rectangular shape cells with highly suberised cell walls and other rectangular narrow and compressed cells, walls are light whitish in colour and not suberised. Therefore the cork is stratified. This region is called rhytidoma.
- Rosette crystals of calcium oxalate and their broken fragments of varying size and shape, simple and compound starch grains scattered as such throughout cortex, the cells of this region filled with reddish brown content.

- The abundant simple and compound starch grains, Rosette crystals of calcium oxalate of varying size and shape, very long non-lignified phloem fibres, mucilage cells, some Schlerenchymatous fibres are also present in phloem parenchymatous cells. This region traversed by medullary rays which are uniseriate but biseriate rays also sometimes and this entire region filled with reddish brown content also

BIBLIOGRAPHY

1. Ayurvedic Drugs and Their plant Sourced by V.V.Sivarajan and Indira bala Chandran published by Oxford & IBH publishing Co. Pvt. Ltd. Newdelhi, Bombay, and Calcutta.
2. Ayurvedic Pharmacopiea of India, Vol.02, Published by CCRAS, Govt. of India,
3. Baghel M.S. Researches in Ayurveda, Mridu Ayurvedic Publications & sale Jamnagar, 2005.
4. Bhavaprakasa Nighantu; Dr. K.C. Chunekar; Edited by G.S. Pandey; Choukhambha Bharati Academy, Varanasi, 2002.
5. Bhavaprakash nighantu (Indian material Medica of Sri Bhavmisra) by Dr. K.C. Chunekar, Published by Caukhambha Bharti academy Varanasi, Reprint, 2002.
6. Classical uses of Medicinal plants by Priya Vrat Sharma Chaukhamba Vishwabharati, Varanasi 1st edition, 1996,
7. College Botany and Applied Botany by Dr. R. M. Saxena and Dr. R. K. Sarbhoy, Arun Prakashan Gwalior.
8. Database on Medicinal plants used in Ayurveda (Vol.03) by P.C.Sharma, M.B. Yelne, T.J. Dennis Published by central council for Research in

- Ayurveda & Siddha (Deptt. Of ISM & H, Min. Of Health & Family welfare, Govt. of India) New Delhi.
9. Dhanwantari Nighantu by Priya Vrat Sharma Translated by Guruprasad Sharma, Chaukhambha Orientalia, 3rd edition, 2002.
 10. Dravyagun hastamlak by vaidya vanvarilal Mishra p. by Publication Scheam, 3rd edition, 1995.
 11. Dravyaguna Vigyana (Materia Medica-vegetable druge) by Dr. Gyanendra Pandey, Krishnadas academy, Varanasi, 2nd edition, 2002.
 12. Dravyaguna-Vijnana (Vol.II) by Prof. P.V. Sharma P. by C.Bh. aca. Bhu. Reprint, 1995.
 13. Essentials of Medical Pharmacology; K.D. Tripathi; Jaypee Brothers Medical Publishers, New Delhi; 5th edition, 2004.
 14. Flora Medica, Important Plants used in medicine by John Lindlel Ajay book service, New Delhi, 1981.
 15. Flora of Madhya Pradesh by D.M. Verma, N.P. Batakrishnan, R.D. Dixit, Published by Botanical survey of India Calcutta, 1993.
 16. Glossary of India Medicinal Plants by R.N.Chopra, S.L.Nayar & I.C. Chopra Published by Council of Scientific & Industrial Reaearch New Delhi, 1956.
 17. Glossary of Vegetable drugs in brhatrayi by Thakur Balwant Singh forward by pandit Shiv Sharma. Published by Chaukhamba Amarabharti Prakashan Varanasi, 2nd edition, 1999.
 18. Indian Materia Medica, by the Late Dr. K.M. Nadkarni Chaukhambha Publications, 3rd Revised edition 1954reprinted, 2000.
 19. Indian Materia Medica (Vol.I) by Dr.K.M. Nadkarni's, Bombay popular prakashan, 3rd revised edition, 1954.
 20. Indian Medicinal Plants, K.R. Kirtikar, major B.D. Basu & Ani. C.S. international book distributors, Dehradun IInd edition.
 21. Indian Medicinal Plants by Vaidyaratnam P.S.Varier's Arya Vaidya sala Kottakkal Published by orient Longman Limited, Hyderabad, 1994.
 22. Indian Phamacopoea of Ayurvedic drugs Govt. of India.
 23. Indian Plants and Drugs with their Medical Properties & uses, by K.M. Nadkarni Published by Asiatic published House Delhi, Reprint Indian edition.
 24. Wealth of India, A Dictionary of Indian Raw Materials and Industrial Products, National Institute of Science Communication and Information Resources Council of Scientific & Industrial Research New Delhi.