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Studies on Crude Bark Drug - *Holoptelea Integrifolia* (Roxb.) Planch.

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ABSTRACT: *Holoptelea integrifolia* is belongs to family Ulmaceae. It is known as *Putigandha, Chirbilva, Putikaranjah, Kanjo, Chiramil, Papri, Tapasimara, Chirabilwa, Avil, Aval, Baval, Vavala, Chirbid, Avil Pattai, Nemalinara, Tapazi* and *Indian elm tree*. The bark is reported to be used for treating inflammation, dyspepsia, flattulence, colic, helminthiasis, vomiting, skin-diseases, leprosy, diabetes and rheumatism. It is bitter, astringent, thermogenic and also used as anti-inflammatory, digestive, carminative, laxative, depurative, anthelmintic and repulsive. The quality of the bark which available in the form of pieces or fine powder in market is doubtful. Therefore attempts were made to standardize the bark by Morphology, Anatomy, and Maceration. By applying above parameter in the combination, the bark of *Holoptelea integrifolia* (Roxb.) Planch. can be standardized.

Key words: *Holoptelea integrifolia*, Bark, drug

Introduction

Bark is an important plant part available from tree species. The term bark refers to all tissues outside the vascular cambium of the axis, in either a primary or secondary state of growth (Shrivastav, 1964). Jackson (1990) defined the term barks as, "The outer integument of the wood and exterior to it i.e. all tissues outside the cambium." According to him bark is frequently restricted to the periderm and the tissue external to it (Esau, 1960). The bark is reported to be used for treating inflammation, dyspepsia, flattulence, colic, helminthiasis, vomiting, skin-diseases, leprosy, diabetes and rheumatism (Sumy *et. al.*, 2000). The bark is bitter, astringent, thermogenic, anti-inflammatory, digestive, carminative, laxative, depurative, anthelmintic, repulsive and urinary astringent. It is useful in vitiated conditions of pitta and cough, haemorrhage (Varriers, 1996), hydrocele (Shrivastava and Jain 2005). *Holoptelea integrifolia* (Roxb.) Planch. bark can be easily adulterated. As the supply of crude drug is inadequate, traders adulterate this genuine crude drug with low grade material. Attempts were made during present investigation to standardize the bark drug by using characters related with Morphology, Anatomy and Phytochemistry.

Result and Discussion

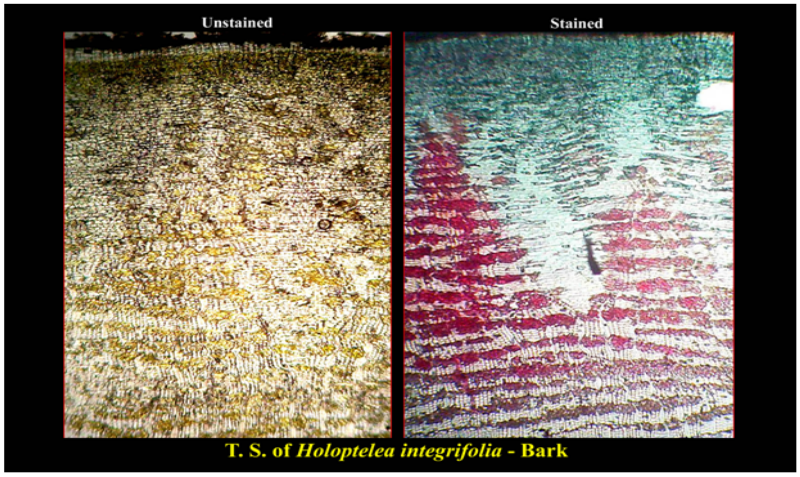
Morphology of Bark

Thickness of fresh bark 9 to 27 mm and dried bark 7 to 11 mm, hard; external surface due to longitudinal fissures and irregular rectangular rhytidomes; silver green in colour; young bark divided by rhytidomes; lenticels abundant, light brown circular spot of 1 to 2 mm in diameter frequently distributed in young bark; inner surface white when fresh and dark brownish when dried, smooth very finely, striated; fracture hard, irregular, fiberous; taste astringent, shape channeled.

Anatomy of Bark

T.S. of mature stem bark shows cork in the outer layer. Two types of cork cells were seen; the outer cork was of 3-5 layered, cells were thin walled tangentially elongated rectangular, reddish in colour. Cells of inner cork 3-5 layered, thick walled, tangentially elongated, rectangular, dark black coloured, cells in outer cork 10-15 x 40-50µ and in inner cortex 15-30 x 40-50µ. Cork cambium 2-3 layered cells resembled with outer cork. Outer cortex was very thick, composed of rectangular cells tangentially elongated, thin walled, compactly arranged having starch grains and crystals. The starch grains single circular 5-10µ in diameter, crystals rhomboidal or squarish, inner cortex was oval, broader cells. Secondary phloem having patches of lignified fibers, 10-30 fibers form a patch. The fibers were polygonal, thick walled with small lumen, patches of fibers were alternating with other phloem elements like phloem parenchyma, sieve elements and companion cells, diameter of fiber ranging from 15-40µ. Large number of patches were alternating with the phloem parenchyma and sclerenchyma. Cells of phloem contain prismatic crystals throughout the phloem zone, phloem rays also contain starch grains sclerenchyma was common in inner phloem than outer phloem.

T.S. of *Holoptelea integrifolia*- Bark



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Maceration of Bark

The maceration shows following cells: parenchymatous cells were of various sizes and shapes. Rectangular elongate cells with average size 15 x 60µ size (Fig 15a). Broader parenchymatous cells were 30-35 x 30-40µ (Fig 15b). Small parenchyma, rectangular blunt at corner, average size 20-40µ (Fig 15c). All the parenchymatous cells were moderately thick walled. Stone cells were of two types, rectangular with blunt corner 25-30 x 50-60µ (Fig 15d). Spherical stone cells with irregular thickened wall. Their diameter ranges from 40-50µ. Lignified fibres 5-8µ thick 300-650µ in length. At certain places biserriate, ray like structure was seen (Fig 15f.) Crystalline fibres thick walled 5-8µ in diameter, 800-1600µ in length, septate regularly. Each septum has a crystal (Fig 15g). Sieve elements were broader 40-50µ in diameter 250-500µ long, end wall oblique, sieve plates scalariform, lateral wall with elliptical lanceolate pits which were continuous or shorter.

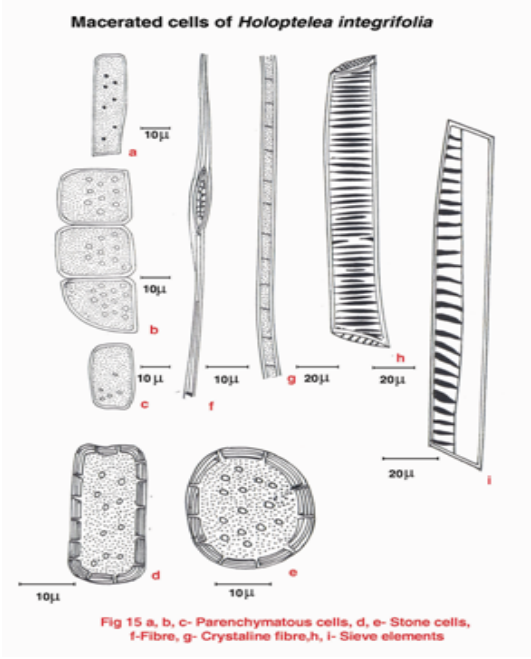

Fig 15 a, b, c- Parenchymatous cells, d, e- Stone cells, f-Fibre, g- Crystaline fibre,h, i- Sieve elements

Photochemistry

The chemicals present in bark drugs were analyzed qualitatively as well as quantitively following (Dhabe, 2003; Mungikar, 1999; Sadasivam and Manickam, 1992). Occurrence or absence of specific chemicals may give the criteria to evaluate standardize the drug. The chemistry of bark is given in table 01, 02 and 03.

Conclusion

Anatomical features including cork, cortex and secondary phloem as well as macerated parenchymatous cells, stone cells, crystalline fiber and sieve element form the criteria for the standardization. Another important Phytochemical parameters can also be used as a criteria of standardization of *Holoptelea integrifolia* bark. The above all parameters in combinations determine genuinity or authenticity of the *Holoptelea integrifolia (Roxb.) Planch.* Bark.

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01. Phytochemistry of bark

Chemical composition	% of DM
Dry Matter (DM)	42.0
Bulk Density mg/cm^3	328
Total Ash	8.45
Nitrogen (N)	1.33
Water soluble Nitrogen	0.20
Carbohydrates	80.24
Total Sugar	1.96
Reducing Sugar	0.76
Non Reducing Sugar	1.21
Crude Fibre (CF)	48.20
Crude Fat (C Fat)	3.0
Cellulose	49.40
Hemicellulose	9.0
Lignin	5.1
Tannins	8.19
Gross Energy Kcal/gm	3.77
Calcium (Ca)	3.0
Phosphorus (P)	0.064
Potassium (K)	0.672

02. Extractive values

Solvents	Percentage
Water	6.12
Methanol	6.20
Alcohol	3.20
Benzene	0.40
Petro. Ether	0.45
Chloroform	2.08
Acetone	1.62

03. Distribution of Phenolic Acid

Phenolic acid	Status
Vanilic acid	+++
Syringic acid	+++
Ferulic acid	+++
Protocatechuic acid	----
P-hydroxy benzoic acid	----
P-coumaric acid	----
Phloretic acid	----
Melilotic acid	----

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