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MORPHOLOGICAL AND ANATOMICAL STUDIES IN *ANOGEISSUS LATIFOLIA* (ROXB. EX DC.) WALL. EX GUILL. &PERR. -(COMBRETACEAE).

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ABSTRACT

Anogeissuslatifolia (Roxb. ex D. C.) Wall. ex Guill. &Perr**.** belongs to family Combretaceae is commonly known as '*Dhawda'* well known for its medicinal value. It is characterized by its tree habit, flowers sessile in the small globose head inflorescence. It is commonly distributed in hill forests of the Marathwada region. In the present investigation detail, morphological and anatomical studies (T.S. of stem, petiole, and leaf) were carried out.

Keywords- *Anogeissuslatifolia*, Combretaceae, Morphology, Anatomy,

Introduction:

The family Combretaceae with about 20 genera and 600 species distributed in tropical and subtropical in regions of the world (Airy Shaw,1973). The members of the family occur in diverse conditions, particularly in primary forest (Terminalia spp.) or deciduous forests. Some of the species (e.g. Anogeissus) thrive in extreme situations like the desert. The species mainly at low or medium altitudes (up to 100m above MSL) but sometimes also ascend 1500-1800m altitudes.

Plants of the family are well known for considerable economic importance. The genus Terminalia L. is of great commercial value to their high-quality timber, bark and fruits of some species of a genus are used medicinally since time immemorial particularly to be their cardiotonic and diuretic properties.

The family Combretaceae was revised for erstwhile British India by Clarke in 1878 subsequently Brandies (1899) revised the genus *Anogeissus* for the region and Blatter (1929) revised Terminalia, while Parkinson (1936) treated the species of the section Pentaptera of *Terminalia*. The treatment of the family by Exell (1954) for the *flora Malesiana* includes a few species that extend their distribution to the Indian subcontinent. A monograph of Anogeissus is recently published by Scoot (1979). Some findings during the course the present revision have

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been published by as us (Gangopadhyay&Chakrabarty 1989. 1990,1992 a,1992 b,1992 c,1993 a,1993 b,1993 c)

The wood anatomy the family is presented Metcalfe & Chalk (1950), followed by van Vliet (1979). The tannin bearing cells occur throughout the plant body, particularly in the pericarp of fruits. Both intraxylary and extraxylary phloem occurs in the vascular bundle of the stem. The vessels are with simple perforations and the intravascular pittings are alternate. The arrangement of wood parenchyma is usually paratracheal. The fibers were moderately long with simple pits.

The revision of the family *Combretaceae* for the Indian sub-continuous recognized 41 species representing 6 genera. It is hoped that despite many limited opportunities at least the identification of the species occurring in the area will be easier and accurate with the presentation.

Geographic distribution

It is distributed throughout India (Warriar, 1994) and Ceylon (Kirtikar and Basu, 1975). The plant is common in the dry deciduous forest except for E. Bengal and Assam. It is found in the Sub-Himalayan tract, from the Ravi to Nepal, Bihar, Chota Nagpur, and ascends to south India (Chopra and Nayar, 1956).

Vernacular names of *Anogeissuslatifolia* (Roxb. ex DC.) Wall. ex Guill. &Perr.

Sanskrit: *Baka, Dhava, Dhavala,*Hindi: *Dhaura, Dhava,*Marathi: *Dhavada*, *Dhamrora*,Bengali: *Dhaoya*, Gujarati: *Dabria, Damora,Bejjalu, Dindiga,* Malyalam: *Marukannirm*, *Vellanav,* Oriya: *Dhonda*, Rajasthani: *Dan, Dhaukra, Dhokri,* English: *Dindiga tree*, *Ghati tree.*

Materials and Methods:

Plant specimens were collected from Shulibhanjan, dist. Aurangabad and authenticated in '*BAMU'* Aurangabad. Fresh materials of stem, petiole, and leaves were preserved in 4 % formalin. Transverse sections of stem, petiole, and leaf were taken by simple hand sectioning by using Laser stainless steel blade followed by double staining method and permanent slides were prepared and observed under the light microscope.

Description

Anogeissuslatifolia (Roxb. ex D. C.) Wall. Ex Guil&Perr. Fl. Seneg. Tent.1: 280, 1832; Bedd. Fl. Sylv. S. India: t15.1869; Brandis for Fl. N. India: 227.1874 &ind. for 25:286, 1874. *Conocarpuslatifolia* Roxb. (Hort. Beng: 34. 1814. *nomen*) ex DC. Prodr. 3:17. 1828

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&Memo. Combret. : 25.1828. *Anogeissuslatifolia* var. *glabra* Clarke, I. c. 450. 1878.edescr. *Alatifolia* var. *tomentosa* Haines for Fl. of Chotanagpur: 364.1910 & Bot Bihar & Orissa 355.1922, e descr.

Shrub or tree, up to 17 m high; bark without greyish, smooth; branch-lets brown to radish 1 – 6 mm thick, terete, initially pubescent. Leaves: opposite, sub-opposite to alternate-ovate, oblong, elliptic-oblong (or broadly so), sub-orbicular ovate, 4 –18x2 –9 cm obtuse cuneate (often somewhat unequal) at the base, obtuse, mucronate, acute or shortly acuminate at apex. Coriaceous, sometimes glossy, glabrous or occasionally villous above. Greyish tomentellous, scattered pubescent to glabrous beneath, pale to dark green or brown or blackish ab1ove dry, paler beneath; lateral nerves 5 – 13 pairs faint prominent above, conspicuous beneath, arcuate; secondary nerves obscure to faint above, faint to prominent beneath, scalariform; petioles 4 – 8 (–15) mm and 1 – 2 mm thick, villous to glabrous. Inflorescence: bracts up to 10 mm in diam. in an axillary and terminal raceme; rachis solitary or 2 – 3 per axil; bracts ovate, lanceolate, triangular, 2 – 4 mm long, caducous; bracteoles 1 – 2 mm long. Flowers: yellow, expanded portion copular, stamens 1.5 – 3 mm long, anthers oblong or ovoid, ca 0.5 mm long, ovary inferior, style 2 – 3 mm long. Fruits: ovate to sub-orbicular in outline, 3 – 6 × 4.5 – 6.5 mm, glabrous shining, greenish-brown or reddish-brown when dry, wings entire or occasionally slightly undulate along margins, 4 – 6 mm long, sparsely puberulous to glabrous, ovate, 4 – 5 × 2 – 3 mm.

Flowering: April-Nov,

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***Fruiting*:** July-Feb.

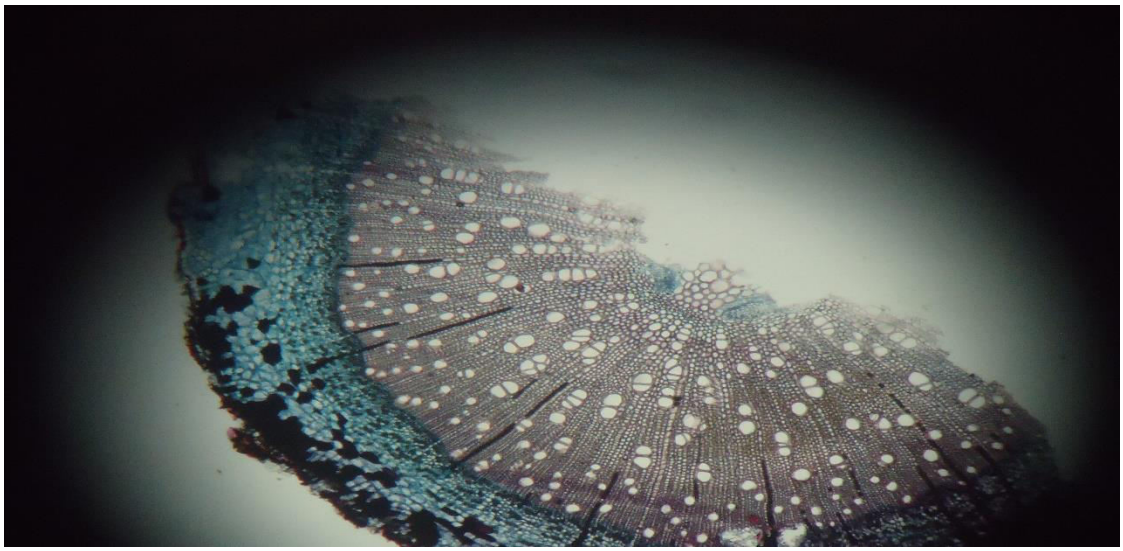
***Distribution*:** Common in hill forests.

Locality :Shulibhanjan, Aurangabad AVK, 005100.

Anatomy of *Anogeissuslatifolia* (Roxb. ex DC.) Wall. ex Guill. &Perr.

T.S. OF STEM:

T. S. of stem shows the following anatomical features:



EPIDERMIS:

The epidermis is covered by a thick cuticle.

Epidermis having barrel-shaped compactly arranged parenchyma.

CORTEX:

Cortex is a 3-5 layered with a scattering of crystals.

ENDODERMIS and PERICYCLE are differentiated xylem endarch.

VASCULAR REGION: Vascular bundles conjoint, collateral, and open. Xylem endarch, vessels show a spiral type of wall thickening. Pith having compactly arranged parenchyma with a scattering of crystals.

T.S. OF PETIOLE:

T. S. of Petiole shows the following anatomical features:

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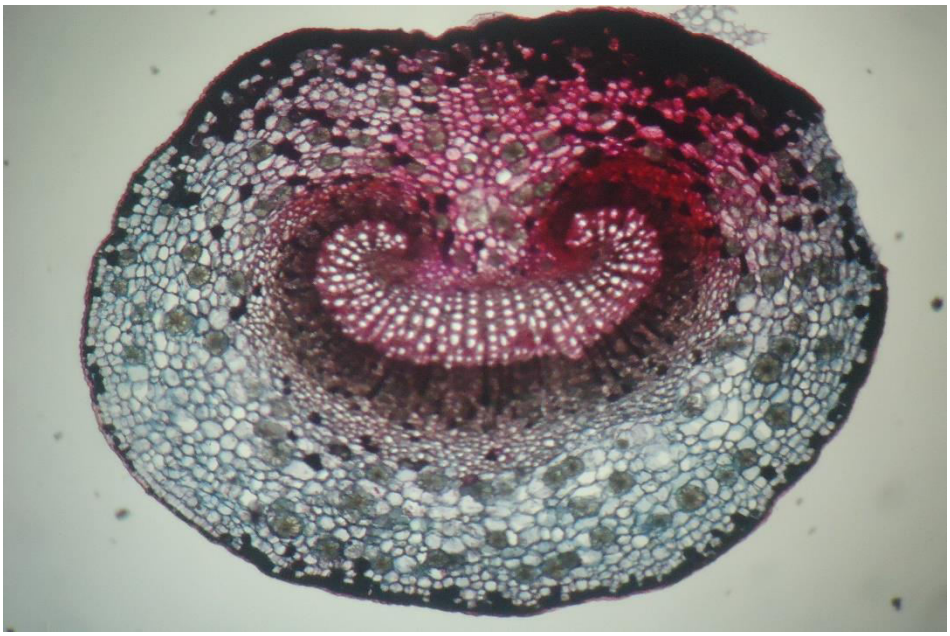

EPIDERMIS:

The epidermis of petioles is covered by elongated Trichomes.

The upper, as well as the lower epidermis of the leaf, is usually made up of a single layer of compactly arranged cell cells.

CORTEX:

Cortex having two to three-layer parenchyma

They are irregularly shaped endodermis and pericycle are differentiated.

The cell of cortex usually arranged distinct rows.

VASCULAR REGION:

Xylem is Zendarch vascular region poorly developed

Pith forms oval shape at the center having crystalloid parenchyma occurred

Cell elongated along the longitudinal plane of the petiole

in the phloem protoxylem and metaxylem are present

transverse section of the *Anogeissuslatifolia* in epidermis, cortex, hypodermis, metaxylem, medullary rays are present.

T. S. of LEAF:

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T. S. of Leaf shows following anatomical featuresThe transverse section of the leaf showed a typical dorsiventralstructure.The epidermis of both the surfaces single-layered, covered with a thick cuticle. The cells of upper epidermis composed of squarish, upright, and rectangular cells.

Lower epidermal cells rectangular, oval, or circular.Upper epidermis followed by vertically elongated, single-layered palisade Spongy mesophyll cells circular, oval, polygonal, and irregular, with the wavy cell wall, thin-walled, loosely arranged. In the midrib region, epidermis followed by single-layered hypodermis restricted to this region. Cortex differentiated into the inner and outer cortex. Outer cortex 3 – 5 layered, polygonal or irregular, Inner cortex 4 – 8 layered, composed of large circular, polygonal or irregular, thin-walled parenchymatous cells. Bundle sheath cells circular, oval, polygonal, and compactly arranged.

Economic importance: (Orwa *et al*.2009)

PRODUCTS:

Fodder: Tussar silkworms are fed on its foliage which is also used as fodder for cattle and buffaloes. *A. latifolia* leavescontain up to 45% digestible nutrients. The leaves contain 7.45-11.5% crude protein. The average digestibilitycoefficients of crude protein, ether extract, crude fiber, and N-free extract are 8, 53, 32, and 64 respectively. Totaldigestible nutrients per 100 kg of dry material work out to 48%. Seasonal variability in the chemical composition of theleaves has been reported.

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Apiculture: Its flowers are an important pollen source for bees.

Fuel: A. latifolia yields good charcoal and firewood with an energy value of 17 600-20 500 kJ/kg.

Timber: Produces a heavy hardwood with a density of 760-940 kg/cu m. Heartwood absent or small; texture fine to medium and even Shrinkage upon seasoning is moderate to high, and the wood is difficult to season as it is liable towarping, splitting, and surface checking. It is possible to modify surface checking completely by soaking in solutions of50% polyethylene glycol-600 for 1 day. The wood is hard, strong, and can be difficult to saw. When mixed with otherwoods can make good packing and writing paper.

Gum or resin: Ghatty gum tapped from *A. latifolia* is a good substitute for gum arabic and is used in calico printing, forsweetmeats, in dye processes, and as a binding agent in pharmaceuticals.

Tannin or dyestuff: The leaves and bark are used for tanning; the leaves yield a black dye that is used commercially inIndia.

Medicine: Used in treating snake bites and scorpion stings in India.

CONCLUSION

Morphological and anatomical study of *Anogeissuslatifolia* reveals standards of identification of the species in the field as well as in the laboratory even in the powder form (After a detailed investigation of anatomic features).

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