IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 3, June 2024

Datiscaceoxylon baradii gen.et sp.nov, a Fossil Dicot Wood from the Deccan Intertrappean Beds of Mahurzari, Nagpur, India

Aparna M. Yadav
Assistant Professor, Department of Botany
J. M. Patel College, Bhandara, India
aparnayadav.83@gmail.com

Abstract: *A petrified wood related to the family Datiscaceae was collected from the Deccan Intertrappean Series of India. The present wood found well preserved in the barad, Mahurzari near Nagpur, Maharashtra State, India. Wood is diffuse porous, tylosed, vessels solitary and in multiples of two to four, perforation plate simple, intervascular pit pairs alternate and bordered, xylem parenchyma paratracheal vasicentric, wood rays biseriate and homogenous, fibres non-septate and non-storied. Comparison is made with the modern families like: - Passifloracea, Onagraceae, Combretaceae, Oxalidaceae and Datiscaceae. It shows great affinities with the family Datsicaceae and hence named as Datiscaceoxylon baradii gen.et sp.nov. The generic name has been assigned on the basis of its affinities with the family and the specific name is after the locality.*

Keywords: Deccan, Series, Perforation, Xylem, Diffuse

I. INTRODUCTION

The Deccan Intertrappean flora is well known for its well-preserved fossils and the variety of plant taxa. Although, all the major groups of the plant kingdom are represented in this flora, it is mainly angiospermous in nature. A majority of angiospermous fossils recovered from the Deccan Intertrappean sediments exposed at various localities have successfully been assigned to the extant angiospermous genera or families.

The present chapter deals with a detailed investigation of a petrified dicotyledonous wood of the family *Datiscaceae* from the Deccan Intertrappean beds of Mahurzari, India. Number of dicotyledonous woods resembling the family *Ampelidaceae*, *Lecythidaceae*, *Anacardiaceae*, *Sterculiaceae*, *Burseraceae*, *Dipterocarpaceae*, *Leguminosae*, *Malvaceae*, *Malpighiaceae*, *Rutaceae*, *Simaroubaceae*, *Tiliaceae*, *Bombaceae, Polygonaceae*, *Ebenaceae* were worked out by different workers. Various wood fossils reported from Deccan Intertrappean Series includes, *Burseraceoxylon baradense*, *Chitaleyoxylon decanense* (Sheikh, 1971), *Ebenoxylon mahurzarii* (Karekar, 1990), *Octomeleoxylon mahurzarii, Oleoxylon mahurzarii* (Wazalwar, 1990).

II. MATERIAL AND METHODS

Collected wood sample was thoroughly ground to make the even surface. It was etched with Hydrofluoric acid and washed under running water. Peels were taken out and slides prepared. These were studied under the microscope and camera lucida sketches were drawn.

III. DESCRIPTION

The fossil is a diffuse porous dicot wood without growth rings. Pith is not well preserved. Wood consists of vessels, xylem parenchyma, wood fibres and wood rays.

Vessel: They are mostly in multiples of two to four (Plate I-Fig.1, 7, 8 & Text Fig.1, 6, 7, 8, 9). These are moderate to somewhat large in size with the diameter varying between 158 µm to 171 µm. The vessels frequency is 14 to17 per sq. mm. Vessel's member length varies from 248 µm to 272 µm. Perforation plate is simple obliquely placed (Plate I-Fig.4 & Text Fig.2). Thick walked vessel clearly seen and filled with dark colour deposition. Vessels are associated with

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wood ray but in between them thick walked 3 to 4 layers of fibres cells are also present. Intervascular bordered pits are well seen. They are alternate thick walled and pit pore are generally elliptical with the diameter varying between 29 µm to 34 µm. Tyloses are distinguishably present. (Plate I-Fig.1, 5, 6 & Text Fig.4)

Xylem parenchyma: Parenchyma is very well preserved, paratracheal vasicentric forming a single layered sheath around the vessels. Cells of parenchyma uniformly distributed and its shape is rectangular. (Plate I-Fig.7, 8 & Text Fig.1, 6, 7, 8, 9)

Wood fibres: They are abundant forming the ground mass of the wood. They are highly thick walled and compactly arranged without air spaces in between wood rays and vessels. The cells are pentagonal to hexagonal in shape, arranged in 2 to 3 layers. Fibres are non - septate, non-storied. They measure 788 µm to 863 µm in height and 92 µm to 111 µm in diameter. (Plate I-Fig.1, 2, 3 & Text Fig.1, 2, 3)

Wood rays: The wood rays are mostly biseriate. It is 6 to 8 cell high; ray system is heterogenous consisting of procumbent as well as erect cells. Frequency of ray is 28 to 35 per sq. mm. Height of rays 153 µm to 238 µm and breadth is about 49 µm to 62 µm. (Plate I-Fig.2, 3 & Text Fig.2, 3, 5).

Tyloses: Tyloses are seen in some vessels but not clear, they are brownish yellow in colour. (Plate I- Fig.5)

IV. IDENTIFICATION AND DISCUSSION

For identification of the present fossil wood, keys given by Metcalfe and Chalk (1950), Shallom (1963) and Esau (1965) are used.

On the basis of distinguishing characters of the fossil wood, like vessels solitary and in multiples of 2 to 4, perforation plate simple, intervascular pit pairs alternate, bordered, xylem parenchyma paratracheal vasicentric, wood rays, biseriate, the studied fossil was compared with earlier reported wood from this locality. *Burseraceoxylon baradense* (Sheikh 1971), Similarities included parenchyma vasicentric, Ray's uniseriate to biseriate, alternating intervascular pits, and elliptical pores bordering the vascular bed but differ significantly in terms of the quantity, frequency, and diameter of vessels. The parenchyma of investigated fossils is usually paratracheal vasicentric, with just biseriate rays.

Chitaleyoxylon deccanense (Sheikh 1971), in this fossil the vessels are solitary, intervascular pores are circular to oval, parenchyma paratracheal vasicentric aliform to confluent, meta-tracheal, rays usually multiseriate, fibres aseptate with intercellular spaces. None of these characters were present in the studied fossil specimen. *Ebenoxylon mahurzarii* (Karekar 1990) has heterogeneous, usually uniseriate xylem rays; vessels are solitary and in multiples of 2–5. Perforations are simple, and inter-vessel pits are bordered, alternating, and parenchyma paratracheal vasicentric. However, in the investigated fossil wood vessels, there are only two or three rays biseriate. The fossil *Octomeleoxylon mahuzarii* (Wazalwar 1990) has medium-sized, mostly solitary vessels with a few in radial multiples. It also has simple and obliquely placed perforation plates, alternate intervascular pitting, xylem parenchyma paratracheal vasicentric rays, heterogenous (2–5) seriate fibers, non-storied fibers, and tylosis. The studied wood fossil exhibits variations in terms of biseriate rays and non-septate fibers. The fossil *Oleoxylon mahurzarii* (Wazalwar, 1990) has solitary vessels in multiples of two, a few in multiples of three to six, and a few in clusters of two to four. It also has tylosed vessels, simple, transversely and obliquely placed perforations, alternate and bordered intervascular pit pairs, paratracheal vasicentric parenchyma, heterogeneous rays that are mostly triseriate and rarely uniseriate, and fibers that are septate and non-septate without storied. But in terms of vessel size, kind, and frequency, it differs significantly from wood fossil. Fibers are non-septate, rays biseriate.

As a result, no discernible similarities were found between the current wood fossil and the previously documented one. In order to assign the wood fossil under any of the current families, this led to an exploration of them.

Comparison is made with the modern families like: - *Passifloracea, Onagraceae, Combretaceae, Oxalidaceae and Datiscaceae.* In the present fossil, parenchyma is typically paratracheal vasicentric and in family *Passifloraceae,* the nature of parenchyma is typically apotracheal, diffuse to numerous, uniseriate bands, occassionally with broader bands, aliform or vasicentric. Hence it cannot be placed in the family *Passifloraceae*. The fossil is not a member of family *Onagraceae,* because the nature and distribution pattern of vessels and parenchyma is broadly different. In *Onagraceae,* vessels are small to moderately small, often with numerous radial multiples and clusters, parenchyma paratracheal scanty. *Combretaceae,* shows vessels which are exclusively solitary or with numerous multiples of 4 or more, perforation simple, intervascular pitting alternate, pits to parenchyma similar to the intervascular pitting. But it greatly

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differs from the fossil in the parenchyma patterns, fibre septation such as in *Combretaceae* parenchyma typically aliform to confluent with some scattered cells, occasionally vasicentric and in terminal bands, rays most typically exclusively uniseriate or rarely biserate, fibres usually septate. The family *Oxalidaceae,* shows vessels often in multiples of 4 or more, perforation simple, intervascular pitting alternate. But here parenchyma is typically vasicentric and scanty, rays uniseriate, heterogenous to almost homogenous, fibres septate. So given fossil is not placed in family *Oxalidaceae*.

The given fossil wood shows large numbers of characters similar to that of the family *Datiscaceae,* like moderate to large sized vessel, perforation simple, intervascular pitting alternate, parenchyma paratracheal vasicentric to slightly aliform, fibres storied, rays heterogenous. But the only difference encountered in arrangement of parenchyma and rays.

While on comparing the studied wood fossil shows more affinities towards the living family *Datiscaceae*. Hence it is named as *Datiscaceoxylon baradii* gen.et sp.nov. The generic name is given after the family *Datiscaceae* to which the extinct fossil wood is assigned whereas the specific name is after the hill locality Barad, Mahurzari, Nagpur, India.

V. DIAGNOSIS

Datiscaceae gen. nov.

Wood dicotyledonous, diffuse porous, vessels solitary and in multiples of 2 to 4, perfoation plate simple, intervascular pit pairs alternate, bordered, xylem parenchyma paratracheal vasicentric, wood rays, biseriate, heterogenous, fibres non-septate, non-storied, tylosis present.

Datiscaceoxylon baradii gen. et sp.nov.

Vessels solitary and in multiples of 2 to 4, vessels diameter varying between 158 µm to 171 µm, frequency is 14 to17 per sq mm, member length various from 248 µm to 272 µm, intervascular pit pair alternate, pore elliptical and diameter 29 µm to 34 µm, parenchyma paratracheal vasicentric, rays biseriate, heterogenous consists of erect and procumbent cells, 6 to 8 cell high, frequency of rays is 28 to 35 per sq. mm., height of ray is 153 µm to 238 µm and breadth is about 49 µm to 62 µm, fibres non-septate, non- storied, tyloses present.

Holotype : AMY. / Wood-4. Department of Botany, Institute of Science Nagpur.
Locality : Mahurzari, Nagpur.
Horizon : Deccan Intertrappean Series of India.
Age : ? Upper Cretaceous.

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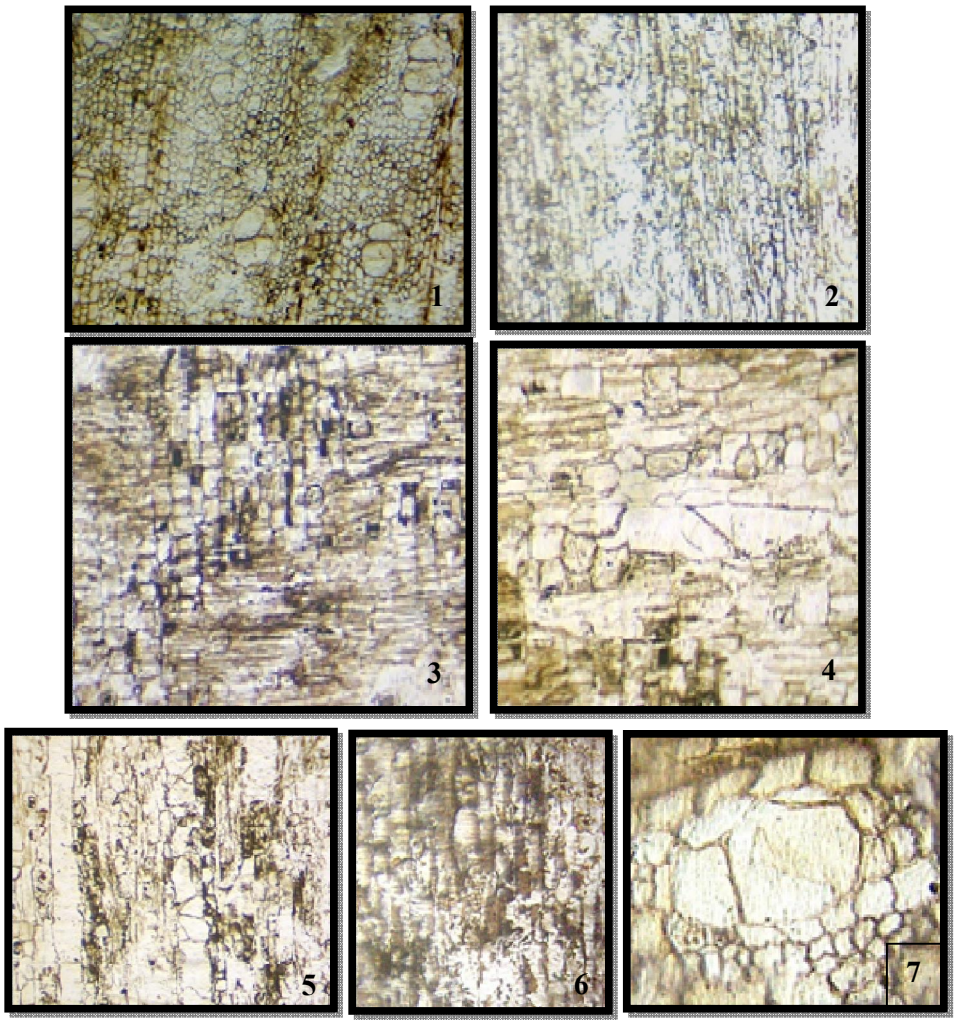
PLATE 1



EXPLANATION OF PLATE

Fig. 1. T.S of wood showing vessels & rays (100X).
Fig. 2. T.L.S of wood showing medullary rays (100X).
Fig. 3. R.L.S of wood showing heterogenous medullary rays with deposition & non-storied fibres (100X).
Fig. 4. R.L.S of wood shows simple obliquely placed perforation plate (100X).
Fig. 5. R.L.S of wood showing tyloses (100X).
Fig. 6. R.L.S of wood showing inter-vessel pitting (400X).
Fig. 7. Vessels surrounded by paratracheal vasicentric parenchyma (400X).