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**Research Article**



## A Report of petrified monocot leaf *Cyperaceophyllum intertrappea* from Deccan Intertrappean beds of Mohgaonkalan, M.P., India

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### Abstract

Present paper describes petrified monocotyledonous leaf collected from exposures of Mohgaonkalan, the well known fossiliferous locality of Deccan Intertrappean beds of India. The present fossil leaf specimen was monocotyledonous. It is exposed in transverse plane. The leaf is bounded on both sides by upper and lower epidermis. Both the epidermis was made up of thick walled parenchymatous cells. Some pores were seen in upper and lower epidermis, may be stomatal openings. The present fossil specimen different from all already reported fossil leaf specimens and does not shows close resemblances to any, fossil monocotyledonous leaves, but shows similarity with the leaf of family *Cyperaceae*. Hence it has been named as *Cyperaceophyllum intertrappea*. The generic name is after family *Cyperaceae* and specific name after Intertrappean beds.

### INTRODUCTION

Intertrappean exposures at Mohgaonkalan, in the Deccan are very rich in fossil flora. The fossiliferous Cherts were collected from Mohgaonkalan locality. On cutting the cherts, monocotyledonous leaf was exposed in transverse plane. Few isolated leaves of monocot, are reported from the Deccan Intertrappean beds of Mohgaonkalan, M.P., India, these are *Aerophyllites surangea* (Patil, 1971), *Smilacites mohgaonsis* (Nambudiri, 1966-70), *Musophyllum indicum* (Bande and Ambawani, 1980), *Palmophyllum dakshinense* (Achutan, 1968), *Aerophyllites intertrappea* (Chitale and Patil, 1970), *Festucophyllites intertrappense* and *Elymus deccanensis* (Patil and Singh, 1977). To compare the present specimen with the already reported

fossil monocot leaves like *Palmophyllum* sp. Trivedi and Chandra (1971) reported palm leaves with air chambers. Bonde (1986) reported palm leaf as *Amesoneuron borassoids*. *Carexophyllum mohgaonse* (Bhowal & Sheikh, 2003) *Musophyllites agashii* (Kokate, 2006), *Thalassiophyllum mahabalei* (Kokate, 2010) and *Hydrocharitaceo phyllum patili* (Narkhede and Nandeshwer, 2011) *Typhophyllites ganeshii* (Kokate, 2012) are few already reported fossil monocot leaves. Coryphoid palm leaf reported Deccan Intertrappean Beds of M.P. (Srivastava R and Srivastava G). *Deccanophyllites sheikhii* (Kokate et al., 2014) and *Potamogenatophyllites intertrappea* (Kokate et al., 2014). The present fossil specimen is different, from all these specimens, hence described here.

## MATERIALS AND METHODS

The silicified fossiliferous cherts, were collected from Deccan Intertrappean beds of Mohgaonkalan, M.P., India having longitude 79° 35' E and latitude 22° 06' N. The material was exposed in transverse plane, after cutting the chert. The material was studied by peel method, taking serial sections of the material.

## RESULTS AND DISCUSSION

The present fossil leaf specimen is monocotyledonous. It is exposed in transverse plane, about 4.14mm in width and 703  $\mu$  thick at midrib region. The thickness of lamina varies between, 148 to 370  $\mu$ . The leaf is bounded on both sides by upper and lower epidermis. Both the epidermis is made up of thick walled parenchymatous cells. Some pores are seen in upper and lower epidermis, may be stomatal openings (Text. fig. 1, Pl. fig. 1,2). Mesophyll region is undifferentiated, consists of thin walled loosely arranged parenchymatous cells with air spaces (Text fig. 1, Pl. figs 3, 4). Vascular bundles are many, oval to elliptical in shape, and are arranged in single row. The size of vascular bundles varies between 74-100  $\mu$ . Each Vascular bundle is conjoint, collateral, and surrounded by thick bundle sheath. It is broken at many places. Xylem and phloem elements not well preserved. Some thick walled cells are seen in vascular bundles towards upper epidermis, which represents xylem elements (Text. fig. 1, Pl. figs 1, 3,).

Few fossil monocotyledonous leaves are reported, from the Deccan Intertrappean beds of Mohgaonkalan and other locality of India. The present fossil leaf is compared with reported fossil leaves, as well as leaves of some families like, *Poaceae* (Gramineae), *Cyperaceae*. On comparison it does not shows close resemblances to any, fossil monocotyledonous leaves, but shows similarity with the leaf of family *Cyperaceae*. The present fossil leaf specimen is 4.14mm in width and 703  $\mu$  thick in midrib region. Mesophyll is with loosely arranged parenchymatous cells, vascular bundles are in single row, oval to elliptical in shape, surrounded by thick bundle sheath.

### Comparison with known fossil leaves

*Achlyphila mohgaoense* (Singh, 1977), is the leaf sheath surrounding the axis, vascular bundle in two alternating rows, abaxial epidermis with bulliform cells, which is different from present fossil specimen.

When present fossil specimen is compared with already reported fossil leaves it shows generally close resemblance with the submerged monocotyledonous leaves. The present fossil do not resembles with leaf of *Cyclanthodendron sahnii* (Sahni and Surange, 1953), *Musocaulon indicum* (Jain, 1963) *Cannaites intertrappea* (Trivedi and Verma, 1971) and *Musophyllaties agashii* (Kokate, 2006) in not having air cavities and fibrous and dumbbell shaped Scitamian type of vascular bundles. It is compared with *Musophyllum indicum* (Prakash, Bande and Ambwani, 1980), it is impression fossil leaf, it does not shows any similarity regarding anatomical details, hence it is different from present fossil leaf.

It is also compared with *Musocaulon indicum* (Jain, 1963), it is a pseudostem, of open concentric leaf sheath, it does not show any resemblances with present fossil leaf. Which suggest that the present fossil specimen does not show affinities with Scitaminae. When present fossil specimen is compared

*Aerophyllites intertrappea* (Chitaley and Patil, 1970) when compared with present fossil is totally differs in size, shape and also in presence of air cavities and sclerenchymatous patches around xylem and phloem. In *Aerophyllites intertrappea* air cavities are small, many in number and present in scattered manner while in present fossil specimen they are absent.

When present fossil specimen is compared with *Festucophyllites intertrappeense* and *Elymus deccanensis* (Patil and Singh, 1977) is differs in arrangement of vascular bundles, presence of fibrous cells as mechanical tissue and presence of bulbiform large cells in the intercostals region and pair of small cells in coastal region which are typical characteristics of Festucoid type of Graminae. As these characters are not observed in the present fossil specimen it might be from other monocotyledons.

When present specimen is compared with *Carexophyllum mohgaonii* (Bhowal and Sheikh, 2003), shows dissimilarities in having a leaf slightly V shaped while the present fossil leaf is elongated and about 4.14 mm in width and 703  $\mu$  thick.

*Thallassiophyllum mahabalei* (Kokate, 2010) when compared with the present fossil specimen resembles in having flat, strap shaped, and differs in having air cavities in single series, mesophyll lacunose, forming outgrowth in air cavities, segmentation of air cavities regular.

When the present fossil leaf specimen is compared with *Typhophyllites ganeshii* (Kokate, 2012) resembles in having air cavities in mesophyll tissue, but differs in not having presence of vascular bundle in partition wall and at upper and lower epidermis. In the present specimen only one row of vascular bundles is present.

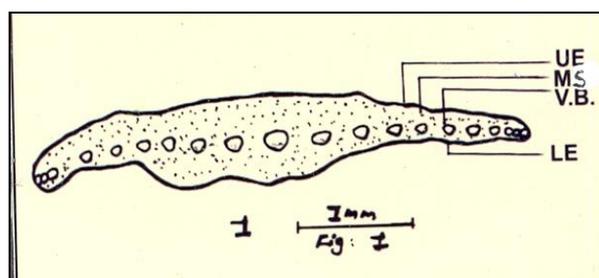
When present fossil leaf compared with *Potamogenatophyllites intertrappea* (Kokate, et al, 2014) shows dissimilarities in not having air spaces and in shape. When present fossil leaf specimen is compared *Rhaphisophyllum mohgaonii* shows dissimilarities in having different shape and size. Present fossil specimen is compared with living genera leaf of *Zea mays*, *Triticum*, of Poaceae (Gramineae). In *Triticum* and *Zeymays*, the leaves

having bigger cells (Bulli form cells) in upper epidermis, sclerenchymatous patches towards upper and lower epidermis, which is not seen in present fossil specimen, hence it is different. It is also compared with genus *Cyperus* of family Cyperaceae, having leaf elongated, vascular bundles in single row, which is seen in present fossil leaf specimen.

Thus from the above discussion and comparison, it is very distinct that, the present fossil leaf is different from, reported fossil leaves, but shares many characters of family Cyperaceae, but does not trace to any particular genus, hence it has been named as *Cyperaceophyllum intertrappea*. The generic name is after family *Cyperaceae* & specific name after Intertrappean beds.

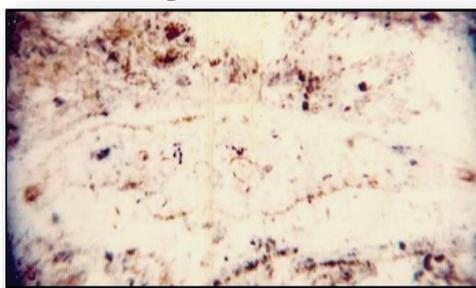
**EXPLANATION OF TEXT FIGURE**

**Fig. 1: T.S. of entire leaf showing upper and lower epidermis (UE & LE), mesophyll (MEP) and vascular bundle in row.**

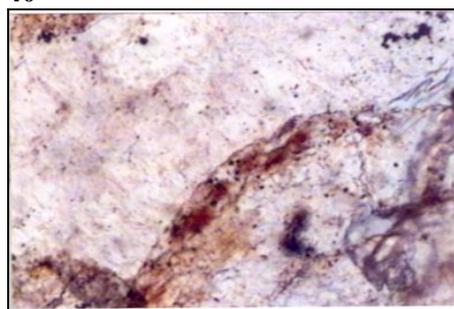


**EXPLANATION OF PLATE FIGURES -1-4.**

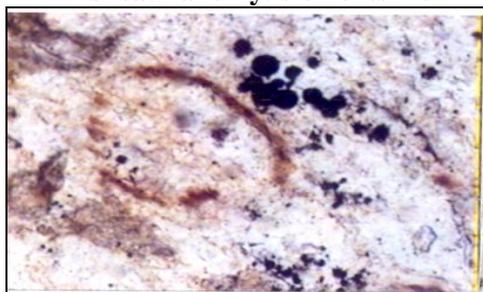
**1 Entire leaf in t. s. showing vascular bundle in single row. x 5**



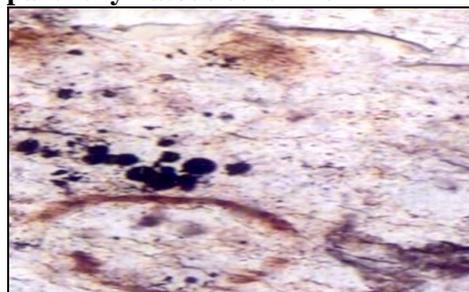
**2.Epidermis showing thick walled cells x 40**



**3.Single vascular bundle showing bundle sheath and xy. elements x40**



**4.Mesophyll showing thin walled parenchymatous cells x 40**



**DIAGNOSIS**

***Cyperaceophyllum intertrappea* gen. nov.**

Leaf monocotyledonous, upper and lower epidermis with thick walled parenchymatous cells, stomatal gaps in upper and lower epidermis, mesophyll with loosely arranged parenchymatous cells, vascular bundle in single row, oval to elliptical in shape, conjoint collateral, surrounded by thick bundle sheath, xylem and phloem not well preserved. Some thick walled cells at upper epidermis represent xylem.

***Cyperaceophyllum intertrappea* gen. et sp. nov.**

Leaf monocotyledonous, 4.14 mm in width, 703  $\mu$  thick in midrib region, upper and lower epidermis thick walled vascular bundles in single row, oval to elliptical in shape, size 74-100  $\mu$ , xylem elements towards upper side.

Holotype	–	MOH/MBB/MON L-2 Deptt of Botany S.S. College, Akola.
Locality	–	Mohgaonkalan, M.P., India.
Horizon of India.	–	Deccan, Intertrappean Series
Age	-	?Uppermost Cretaceous.

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