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A NEW MULTILOCULAR FRUIT FROM THE DECCAN INTERTRAPPEAN BEDS OF MOHGAON KALAN, M.P. INDIA

Lina S. Konde

ABSTRACT

The paper describes a multilocular capsular fruit collected from the inter-trappean beds of Mohgaon kalan. The fruit is dicotyledonous, multilocular, multiseeded with axile placentation. Pericarp differentiated into epicarp, mesocarp and endocarp. Epicarp with epidermis followed by thin parenchymatous cells. Mesocarp with air cavities and parenchymatous cells. Endocarp having thick walled parenchymatous cells without intercellular spaces. It is multilocular and multiseeded with single seed in each locule with axile placentation. The fossil is compared with the living families Malvaceae, Pittosporaceae, Ochnaceae, Melastomaceae, Begoniaceae, Companulaceae and Lythraceae and also with already described fossil multilocular fruits *Indocarpa intertrappea* (Jain, 1964), *Harrisocarpon sahnii* (Chitaley and Nambudari, 1973), *Sahniocarpon harrissi*(Chitaley and Patil, 1973), *Daberocarpon gerhardii* (Chitaley and Sheikh, 1971), *Deccanocarpon arnoldii* (Paradkar, 1975), *Wingospermocarpon mohgaonse* (Sheikh and Kapgate, 1984), *Triloculocarpon mahabalei* (Kapgate, 1982), *Burseraceocarpon ramanujami* (Adhao, 1986) *Gardoniocarpon mohgaonse* and *Nicardocarpon ramanujami* (Chudiwale, 1990) and *Enigmocarpon parijaii* (Sahni, 1943). It is evident from the study that the fossil fruit is referable to family Lythraceae but does not correlate with any of the living and fossil genus described earlier in toto. Therefore, it is placed under new form genus *Rodeocarpon mohgaonse* gen.et.sp.nov. the generic name being after the well known Geologist late Prof. K. P. Rode and specific name is after the locality Mohgaon kalan.

INTRODUCTION

The present paper incorporates the detailed morphological and anatomical description of a capsular fruit from the Deccan Intertrappean beds of Mohgaon kalan. A number of dicotyledonous fruit have been described from Deccan Intertrappean India. *Enigmocarpon* **(**Sahni 1943) is a well known capsular fruit among these. *Indocarpa intertrappea* (Jain, 1964**),** *Harrisocarpon Sahni* (Chitaley and Nambudari, 1968), *Sahniocarpon harissi* (Chitaley and Patil, 1973), *Daberocarpon gerhardii* (Chitaley and sheikh, 1971) *Deccanocarpon arnoldii* (Paradkar, 1975), *Wingospermocarpon mohgaonse* (Sheikh and Kapgate, 1980), *Triloculocarpon mahabalei* (Kapgate, 1982), *Burseraceocarpon ramanujamii* (Adhao, 1986) *Gardoniocarpon mohgaense* and *Nicardiocarpon ramanujami* (Chudiwale, 1990) are the dicotyledonous capsular fruits reported from the Deccan Intertrappean beds of Mohgaon Kalan. The Present capsular fruit is the additional report of capsular fruit from the Deccan Intertrappean beds of Mahgaon Kalan.

MATERIAL AND METHOD

The material is very well preserved in a brown chert collected from the Deccan Intertrappean beds of Mohgaon kalan, Dist. Chhindwara, (Lat.21 °,30' to 22°,55', N and Long. 78°,15'to 79°,20' of Madhya Pradesh). Both part and counterpart were available in a oblique longitudinal view. After etching oval fruit with many seeds was visible to the naked eyes. Serial peel sections were taken along the longitudinal plane and after few sections, counterpart of the chert was cut in the transverse view and peel sections were taken along transverse plane also.

DESCRIPTION

The fruit is oval to oblong in shape with rounded ends and measures 11 mm in length and 8mm in breadth. It is a petrified fruit with excellent cellular preservation. The outer boundary of the fruit is somewhat wavy. The fruit consists of pericarp, central axis with placentae, many seeds and number of septae. The major part of the fruit is occupied by numerous seeds and central axis with placentae (Fig.1).

Pericarp : The pericarp of the fruit is not very thick as compared to the size of the fruit. It is moderately thick, measuring about 350µ to 380µ. The pericarp is well differentiated into epicarp, mesocarp and endocarp (fig.1,2,).

Epicarp : It is somewhat wavy and measures 105µ in thickness. Outermost layer of epicarp is epidermis which is wavy and single layered. It consists of barrel shaped parenchymatous cells which are compactly arranged. Individual cell of epidemis measures 35µ x 11µ in size. All the walls of epidermal cells are uniformely thickened . Below the epidermis, a transparent layer is seen. Cells in this layer are not well preserved all over. At few places, thin walled parenchymatous angular cells are preserved in this layer (fig. 7) which measure 11 µ in size.

Mesocarp : It measures 182µ in thickness. This layer is made up of large air cavities of different sizes (fig.3). Air cavities measure about 17µ to 20µ x 47µ to 82µ in size. The space between the air cavities is packed with thin parenchymatous cells having dark black contents which might be due to some depositions.

Endocarp : It is the innermost layer of pericarp and measures about 7-8 layers of thick walled parenchymatous cells without intercellular spaces (fig.3). It is about 100µ in thickness and individual parenchymatous cell measures about 8µ to 11µ in size.

Central axis : As the fruit is exposed in a oblique plane central axis appears in the form of elongated and quite massive structure in the centre of the fruit (figs. 1,4). The cells of axis are parenchymatous which are loosely arranged. Each cell measures 8µ to 11µ in diameter. In between parenchymatous cells, some cavities are present. These cavities measures 23µ to 26µ x 52µ to 70µ in size. However vascular trace is not seen in the axis.

Seed : The space between endocarp and central axis is packed with numerous seeds. The seeds are attached to the placentae on central axis (fig. 1). As the fruit is cut in oblique plane, exact number of placentae could not be ascertained, but over all appearance gives the idea of presence of many placentae on the central axis. Majority of the locules have single seed per locule. The exact number of locule and seed could not be ascertained as the fruit is not cut in perfect T.S. The septae are seen arising from the central axis and they meet the endocarp. The septae are made up of compactly arranged parenchymatous cells (fig.5). The septae measure 17µ to 52µ in breadth and 823µ to 882µ in length. They are narrow in the middle and become broad on both ends.

The size and shape of the seeds vary as they are cut in oblique planes. The smallest seed is almost rounded and measures 70µ x 141µ in size and the largest seed measures 141µ x 329µ in size. The seed is more or less elongated with almost rounded end towards the periphery of the fruit and becomes narrow and pointed towards the central axis (figs. 1,2). Seed consists of seed coat and endosperm. Seed coat is not differentiated into testa and tegmen. Cells of seed coat consists of single layer of more or less squarish cells (fig.6). Inside the seed coat, in some seeds, there is a uniform mass of parenchymatous cells which represent cellular endosperm. In some seeds two zones are clearly visible. One zone represents cellular endosperm which is dark in colour and other zone represent endosperm at free nuclear stage where walls are absent (fig.2) and it appears light and contain some depositions. Embryo is not preserved.

DISCUSSION AND CONCLUSION

The appearance of the fruit indicates that it is a dicotyledonous, multilocular, multicarpellary, capsular fruit with many seeds showing axile placentation . Many families like Malvaceae,Pittosporaceae, Ochnaceae, Melastomaceae, Begoniaceae, Companulaceae and Lythraceae.(Corner , 1976; Cooke 1958) shows such characters.

Malvaceae has multilocular capsular fruit with axile placentation. But the seed coat is very different from fossil fruit. In Malvaceae tegmen is 8-12 cells thick while in fossil fruit it is not well differentiated. In Pittosporaceae, the seed coat is unspecialised with 6-12 cells thick and aerenchymatous and endosperm is nuclear. This is not the condition with fossil fruit. In Ochnaceae the placentation is axile, seed coat is thin and non multiplicative but the ovary is ten lobed while in fossil material the exact number of locules is not confirmed but it is more than ten. The seeds of Melastomaceae have only nuclear endosperm and it does not form cellular tissue while fossil fruit shows nuclear and cellular endosperm. The fossil fruit is also different from the fruits of family Begoniaceae in having nuclear endosperm, reduced to a single layer of cells in the seed. Seed coat is 3-4 cells thick. Testa is composed of much enlarged cuboid cells with lignified pitted inner wall with polygonal facets. In Companulaceae, outer layer of seed is composed of cuboid cells with lignified and pitted inner wall with polygonal facets. In Companulaceae, outer layer of seed is composed of cuboid cells with strongly thickened, pitted and lignified radial and inner walls. This character is not seen in fossil fruit under investigation. In Companulaceae only cellular endosperm is present whereas in fossil fruit both cellular and nuclear endosperm are present. So,it is not comparable with the fossil fruit. In Lythraceae the fruits are capsules with many locules, many seeds and axile placentation. The testa and tegmen are not multiplicative. So the fossil fruit shows close resemblances with the fruits of family Lythraceae in having multilocular, multiseeded capsular fruit but the comparisons are not made at the generic level because in fossil fruit the details of embryo and place of dehiscence are not seen.

The fossil fruit is compared with the multilocular capsular fruits showing axile placentation known from the Deccan Intertrappean beds of Mohgaon Kalan. *Indocarpa intertrappea* (Jain, 1964) is

tetralocular and multiseeded capsule. *Harrisocarpon sahnii* **(**Chitaley and Nambudari, 1973) is ribed pentalocular capsule with two seeds in each loculus. *Sahniocarpon harrissi* (Chitaley and Patil,1973) is pentalocular capsule with one seed in each locule. *Daberocarpon gerhardii* (Chitaley and Sheikh, 1971) is ten locular with one seed in each locule while fossil fruit have more than 10 locules. *Deccanocarpon arnoldii* **(**Paradkar, 1975) is eight locular capsule with one row of seeds in each locule is also different from fossil fruit under consideration. *Wingospermocarpon mohgaonse* (Sheikh and Kapgate,1984) is unilocular oval fruit with winged seeds. *Triloculocarpon Mahabalei* (Kapgate, 1982), *Burseraceocarpon ramanujami* (Adhao, 1986), *Gardoniocarpon mohgaonse* and *Nicardocarpon ramanujami* (Chudiwale, 1990) are trilocular capsular fruits of which *Gardoniocarpon mohgaonse* shows loculicidal dehiscence and has persistent perianth. All these capsular fruits are not comparable with the fossil fruit under investigation.

The well known *Enigmocarpon* is a multilocular, multiseeded capsule which shows axile placentation. Different species of *Enigmocarpon* are recorded. In *Enigmocarpon parijaii,* Sahni (1943) reported 6-7 locular loculicidal capsule which shows two rows of seeds in each locule and differs from the fossil specimen because fossil fruit has more than 7 locule and usually only one seed in each locule. In *E. Parijaii* there is a presence of lysigenous cavity which is not seen in fossil fruit. The pericarp of *E. parijaii* is made up of thick walled elongated cells while in fossil fruit, the fruit wall is made up of angular parenchymatous tissue with some air cavities. *E. sahnii* (Chitaley and Kate, 1977) shows presence of eight locules and is ellipsoidal and globular in shape while present fossil fruit has more than eight locules and also different from *E. Sahnii* in many anatomical details. In *E. Sahnii* the outer epidermis of the fruit wall is of thin walled parenchymatous cells followed by hypodermis of 6-8 layers of thick walled cells with brown to black contents and the rest of the fruit wall is made up of parenchymatous spongy tissue while in fossil fruit under investigation the outermost layer of the fruit wall is epidermis which is wavy and made up of barrel shaped parenchymatous cells followed by very thin parenchymatous angular cells. The middle layer is mesocarp which shows presence of air cavities and the innermost layer is endocarp which shows thick walled parenchymatous cells with small intercellular spaces. Globular, stalked outgrowths seen in different stages of development on inner epidermis and on septae in *E. Sahnii* are not seen in the fossil fruit under consideration.

The seeds are 6 or more per loculus and horizontally packed back to back into alternating rows in *E. Sahnii* while in fossil fruit only one seed is present in each locule though in one locule, there are 3-4 seeds which may be due to oblique cutting of fossil. In *E. Sahnii*, the placentae shows presence of central lysigenous cavity with sausage shaped patch of thin walled parenchymatous cells on inner zone of placentae. However, such cavity is lacking in fossil fruit. The placentae in present fossil fruit consists of parenchymatous cells with small air cavities.

Hence, from the above discussion it is evident that the fossil fruit is dicotyledonous, multilocular, multiseeded capsular fruit with axile placentation referable to family Lythraceae but does not correlate with any of the living or fossil genus described earlier in toto and hence temporarily it is placed under new form genus *Rodeocarpon mohgaonse* gen.et.sp.nov. till we get some more specimen of the material showing details of embryo. The generic name is being after the well known Geologist late Prof. K.P. Rode and specific name is after the locality Mohgaon kalan.

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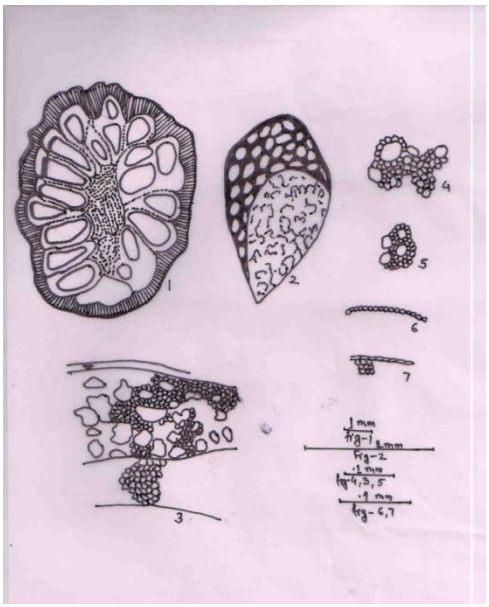
Explaination of figs.

1) L.S. of fruit showing pericarp,central axis and multilocular, multiseeded condition.
2) Single seed showing cells of endosperm.
3) T.S. pericarp showing single layered epicarp, thick mesocarp with air cavities and parenchymatous endocarp.
4) Cells of central axis with air cavities.
5) Cells of septae.
6) Seed coat showing undifferentiated squerish cells.
7) Epicarp showing barrel shaped parenchymatous cells followed by some angular parenchymatous cells.



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