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Research Article



***Momordiacarpon deccanii* gen.et.sp.nov.A petrified berry fruit form the Deccan Intertrappean Beds of Mohagaonkalan, Chindwara District, Madhya Pradesh, India**

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Abstract

The paper reports the record of a petrified dicot berry fruit from the Deccan Intertrappean beds of Mohagaonkalan, Chindwara District, Madhya Pradesh. The fruit is minute having 4.5 cm length and 2.29 cm breadth. Fruit is unilocular consisting of well-preserved spiny out growth on pericarp. Fruit is ellipsoidal in shape. Fruit wall shows 3 to 6 layer of parenchymatous cells. Seeds are not well preserved. The study shows that the fossil fruit is not comparable with any living as well as reported fossil fruits, hence, a new form genus *Momordiacarpon* name is given after the genus of *Momardica* and species *deccanii* after the deccan bed of India.

INTRODUCTION

The fossil flora of Mohagaonkalan is quite abundant in variety of its components as comparison to other Deccan Intertrappean flora. The flora, which has been assigned an upper Cretaceous. There are limited records of petrified berry fruits from the Mohagaonkalan assemblage. So far the only multilocular berry fruits are reported have been from these beds areas follows-

Mohagaoncarpon eydei (Yawale, 1977)
Kremocarpon indicium (Upadhye and Patil, 1978)
Erythroxylocarpon intertrappea (Khubalkar, 1982)
and *Kremocarpon aquatica* (Kate, 1974),
Cucurbitaceocarpon sahani (Bobade, 2005),
Bicarpelocarpon Singhpurii (Bhowal and Sheikh, 2008),
Portulacaceaeocarpon jamsavlii (Meshram et al., 2011) and (Kapgate, 2013) *Spinocarpon mohgaoense*, (Kokate, 2013). *Solanaceaeocarpon agashi* (Thorat 2015), *Coffeocarpon deccanii* (Dighe, 2017). *Azimocarpon indicum* (Dighe, 2017). The present report is the first record of Berry, multi layered fossil fruit from Mohagaonkalan.

MATERIALS AND METHODS

The material is preserved in black chert. After breaking the sample it was cut along the transverse and oblique longitudinal plane. Anatomical details were studied using peel techniques method to study the recovered fruit.

DESCRIPTION

The fruit is cut in transverse plane at its upper side and longitudinal along, its basal side (plate Fig.1; text Fig. 3). The oblique longitudinal serial sections of the fruit shows that it is ellipsoidal in shape, globular and fleshy in nature. It measures 4.5 cm in length and 2.29 cm in breadth, with well-preserved unilocular fossil fruit having spiny out growth on pericarp. (Plate Fig.1, Text Fig. 3). The fruit is sessile. Fruit is broadly divided into fruit wall i.e. Pericarp. And the central pulpy part. Pericarp is Echinata i.e. covered by Spine at some part of fruit which is very interesting feature of fruit.

Measuring range from 3.3 mm in thickness and 2 mm in breadth in thickness .Anatomical details of the fruit are as follows.

Pericarp

Pericarp of the fruit is multilayered and differentiated into epicarp, mesocarp and endocarp. The pericarp is well preserved with spiny out growth. (Plate Fig. 2; Text Fig. 4). It is measured 3.3mm in thickness and 2mm in breath.(Plate fig.2 and text fig.1)

Epicarp

Epicarp is outer most layer of berry fruit. It is formed of compact parenchyma cells with wavy in outline 0.133 mm thickness and each cell varies from about 9.65 μm and 6.61 μm (Plate Fig.2; Text Fig. 3) in size.

Mesocarp

Mesocarp is the middle and broadest zone of pericarp, 165 μm up to 237 μm in thickness, made up of rectangular, thin walled parenchymatous cells, each cell varies from 0.161 μm to 0.169 μm in size. It is fleshy and Colossal, also refers to as the flesh of the Berry fruit. Mesocarp is fibrous in nature. Epicarp and mesocarp forms external out-growths at places forming ridges and furrows of the pericarp (Plate Fig. 1; Text Fig.2; Fig 5). Mesocarp consist of horizontally greater depth due to an air cavities at lower side of fossil fruit. An air cavities are measured about 0.33 mm up to 0.99 mm in thickness.

Endocarp

Endocarp is innermost layer of the pericarp consisting of thick wall compactly arranged cells. The seeds are not well preserved. It is measured about 165 μm in thickness. The central cavity of fruit might be pulpy in nature, as the cells are highly thin walled. . Each cell is measured about 66 μm up to 96.3 μm varies in size. Embryo is well preserved (Plate Fig. 3; Text Fig.5).

Discussion and comparison

The anatomical and morphological features are observed in present fossil berry fruit .It is ellipsoidal in shape globus, colossal and fleshy in nature .Fruit wall broadly divided into three parts i.e. epicarp, mesocarp and endocarp.

DISCUSSION

The characteristic features of the describe fruit of identification are Fossil berry fruit is ellipsoidal in shape, globular, colossal and fleshy in nature.

Fruit is broadly divided into two parts fruit wall and central cavity. Pericarp consist of epicarp, mesocarp and endocarp. Epicarp is made up of thin wall parenchymatous cells and the seeds are not well preserved.

Mesocarp is the middle and broadest zone of pericarp, which is made up of rectangular, thin walled parenchymatous cells

Endocarp is the stony part of the fossil berry fruit placentation might be parietal placentation with only one chamber.

Interesting features about the fruit is endosperm is the principle reserve tissue of the seed might be edible part of the fruit. From the above features it confirmed that the fossil specimen in Berry like fruit with the pericarp and parenchyma tissue is present in central part of the fossil fruit.

Comparison of reported fossil fruit

The present fossil fruit is also compared with already reported Follows as Fossil berry fruits.

Kremocarpon aquatica (Kate, 1974. Chitale and Kate, 1975) is unilocular fibrous berry having the fleshy epicarp fibrous mesocarp with vascular supply having three seeds.

In present fossil fruit, pericarp is fleshy and parenchymatous also seeds are not seen clearly. The pericarp covered by spine, which is not seen in the already reported fossil fruit *Kremocarpon aquatica*.

Mohagaonkalan eydei (Yawale, 1977) is unilocular many seeded berry and globular in shape. While present fossil fruit is ellipsoidal in shape, unilocular and seeds are not seen clearly.

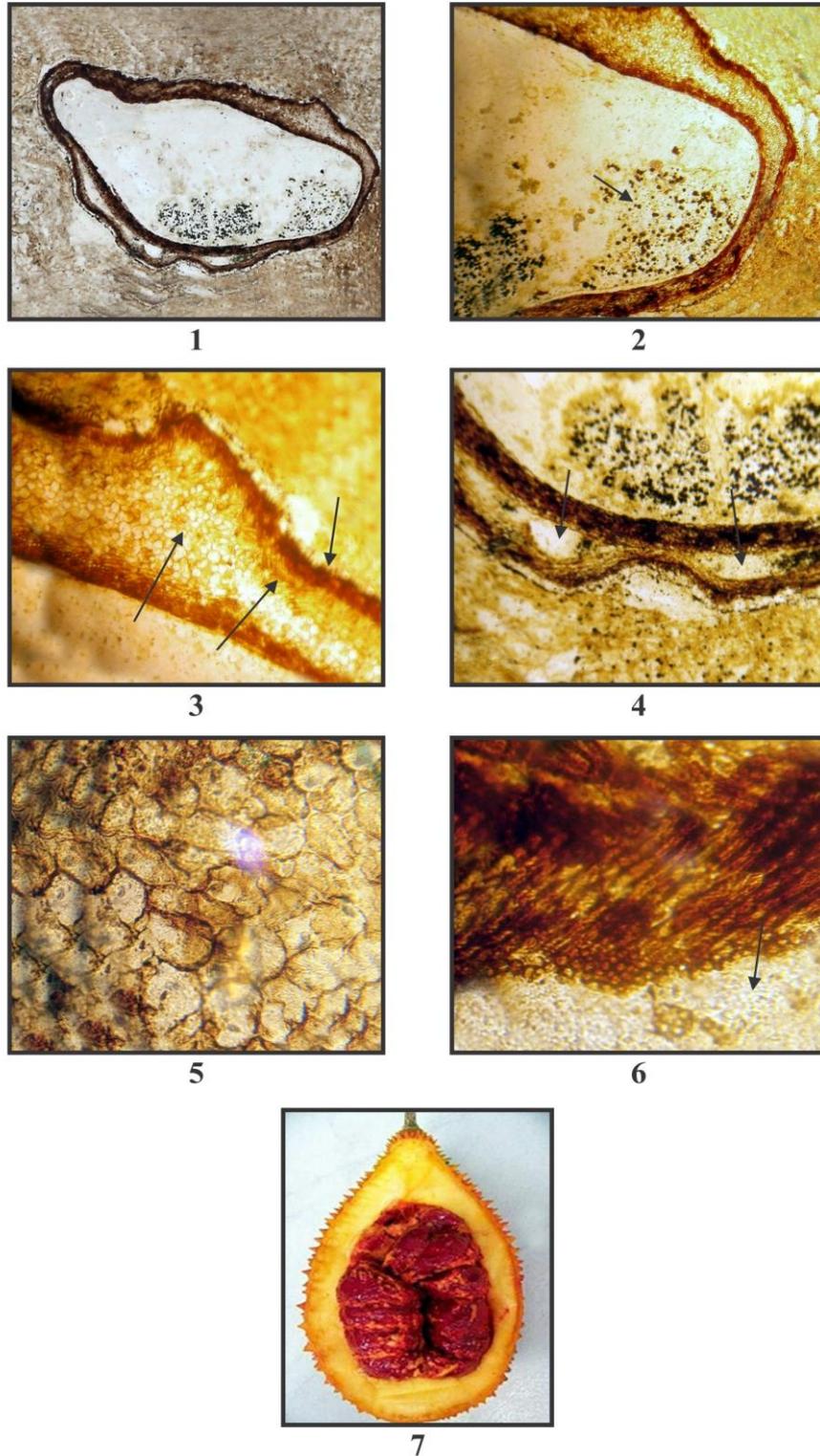
When present fossil fruit is compared with *Kremocarpon indicium* (Upadhye and Patil 1978). It shows the similarities with present berry fruit but differ in unilocular condition observed in transverse plane and also differ in shape and size.

Cucurbitaceocarpon sahani (bobade, 2005), when compared with present specimen shows the similarity in having berry type of fruit but is different in having pulpy endosperm and mass of seeds.

Solanoceocarpon agashi (Thorat, 2015) is spherical in shape Globus and fleshy in nature but present fossil fruit differ in structure endosperm and mass of the seed.

Coffeocarpon deccanii (Dighe, 2017) is spherical in shape globus and fleshy in nature, fruit broadly divided into the fruit wall, while present fossil fruit is ellipsoidal in shape. Mesocarp is fibrous in nature and colossal, fleshy of the berry fossil fruit hence it is differ from present fossil fruit.

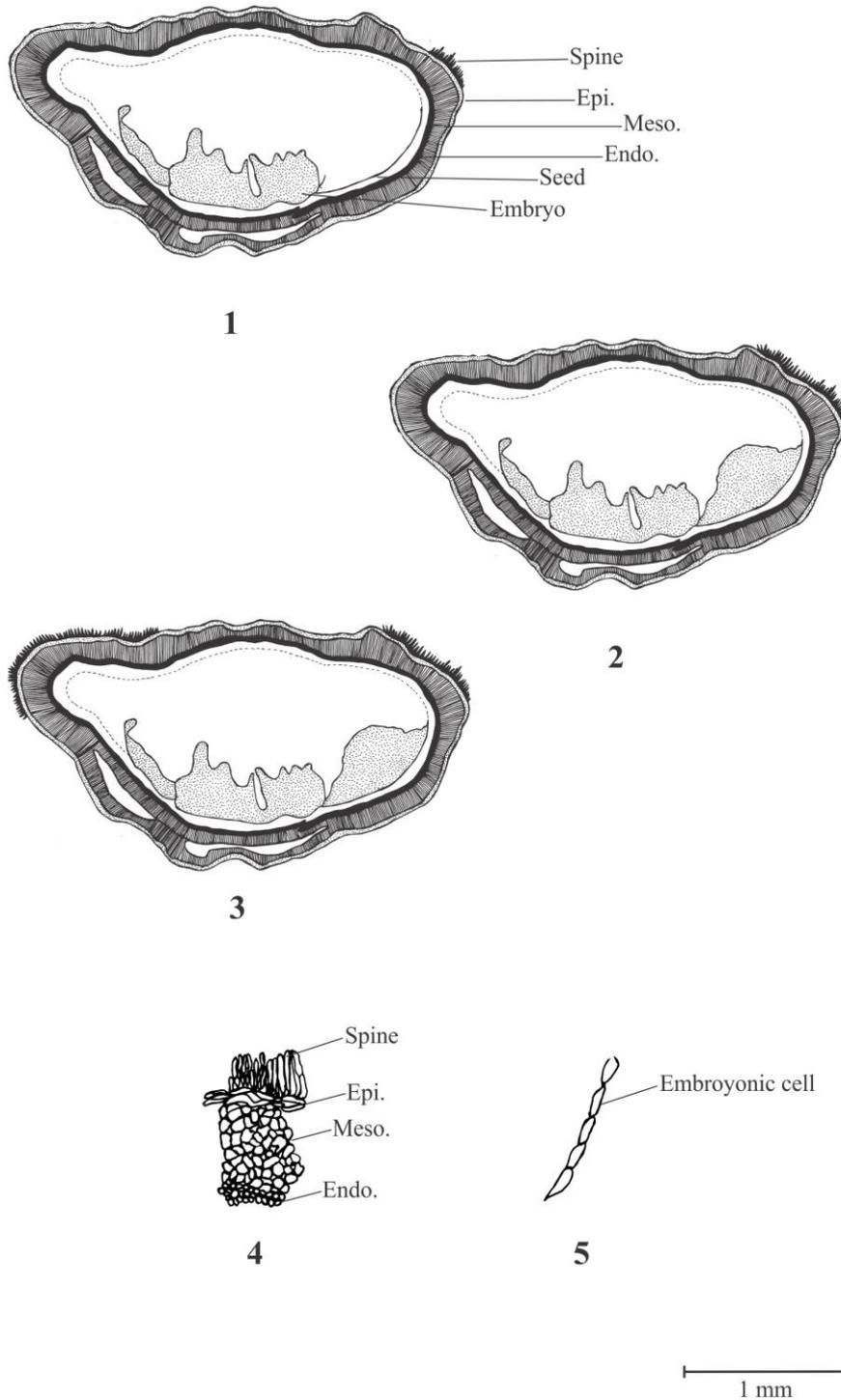
Momordiacarpon deccanii gen. et. sp. nov.



Explanation of Plate Figure 1 - 7

- 1 : L.S. of fruit showing complete structure 10x; 2 : L.S. of Fruit showing Embryo 40x;
3 : L.S. of fruit showing with epicarp, mesocarp, endocarp 40x; 4 : L.S. of fruit showing two
cavities in pericarp 40x; 5 : Cells of endocarp 100x; 6 : Cells of embryo 40x;
7 : Living fruit of Momardica species

Momordiacarpon deccanii gen. et. sp. nov.



Explanation of Text Figure 1 - 5

1 - 3 : L.S. of fruit in serial section showing pericarp and embryo with parenchymatous central part and two cavity in mesocarp; 4 : Cellular details of pericarp, spine; 5 : Cellular details of embryonic cell.

Azimocarpon indicium (Dighe, 2017) fruit is ellipsoidal in shape with two projection near the base of the embryo with two cotyledons, single seed in horizontal position but in present fossil fruit many seeds are preserved in mass of the seeds so the present fossil fruit is differ from the present for fossil fruit.

From the above discussion and comparison, it is observed that the present fossil fruit is more or less similar to fruit of family Cucurbitaceae. When the present fossil fruit is compared with genus *Momardica* showing in having Globus and ellipsoidal in shape with tricome fruit oblong, ellipsoid 8-25 cm long muricate – tuberculate, dehiscing at apex.

While the genera *Momardica* from the same family shows fruit ovoid 3-5 cm long, green echinates when the present fossil fruit is compared with the genus *Benincasa* showing in having fruits 52-60 x 10-25 cm, densely hairy when young thickly deposited with waxy bloom when matured.

While in genus *Luffa* 10-12 x 7-8, 10 angles and considerate at the apex. The present fossil specimen shows close resemblance with the genus *Momardica* then the genera *Benincasa* and *Luffa*. Hence the present fossil specimen is named as *Momardiocarpan* and species name is given as *intertrappea* after fossiliferous intertrappean beds of Deccan.

Comparison with modern families

In family Verbenaceae the fruit either berry or drupe. Ovary 2 to 4 locular with 1-2 ovules in each locule. Fruits are usually present in group which is not seen in the present fossil fruit. In family Vitaceae fruit berry is present fruit shows the similarities in having fruit type berry, but differ in having fruit with 1-6 chamber berry 1-2 seed in each chamber. In family Rubiaceae berry fruit is berry with axile presentation but differ in having in ovary to many locular. In family Sapotaceae fruit is having 1-8 locular berry with ovule in each in locule, which is different from present fossil fruit. Solanaceae family shows the similarity in fruit type is berry but differ in having the bilocular in a transvers section of fossil berry fruit. Musaceae family shows similarities in fruit type i.e. Berry but differ in having tricarpeal, trilocular nature with many ovules in each locule.

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The fruits show the various degree of resemblance to some families has berry fruits. This family are Verbenaceae, Rutaceae, Villoaceae, Cactaceae, Rubiaceae, Sapotaceae, Musaceae and Solanaceae. Out of this present Fossil fruits it shows the resemblance with family Cucurbitaceae in many aspects Genus *Momardica*.

Hence, from the above description and structure of present fossil fruit should be close family Cucurbitaceae.

Holotype - MOH/RND/DICOT/FRUIT –I
Department of Botany, Shri Shivaji
College, Akola
Locality - Mohagaonkalan, district
Chhindwara MP. India.
Horizontal - Deccan Intertrappean bed, India
Age - Upper cretaceous

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