

RESEARCH ARTICLE

Fungus *Botryodiplodia deccanii* form Mohgaonkalan Cherts, M.P., India

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Manuscript Details	ABSTRACT
<p>Received : 18.12.2014 Revised : 05.01.2015 Revised Received : 15.01.2015 Accepted : 18.01.2015 Published: 25.01.2015</p> <p>ISSN: 2322-0015</p>	<p>Present paper deals with fungi imperfecti from Deccan Intertrappean beds of Mohgaonkalan Cherts. Here Pycnidia black coloured and compact, round halfmoon or semicircular in shape. Semicircular pycnidia open to exterior by ostiole and hyphae branched separate and multicellular forming pseudoparenchymatous funagal tissue, conidiophores branches, conidia bicelled, dark coloured, elongated to ovoid</p> <p>Keywords: Hyphea, Pycnidia, Imperfecti.</p>
<p>Cite this article as:</p> <p>Puranik SD. Fungus <i>Botryodiplodia deccanii</i> form Mohgaonkalan Cherts, M.P., India, <i>Int. Res. J. of Sci. & Engg.</i>, 2015; 3(1):24-27.</p> <p>Copyright: © Author(s), This is an open access article under the terms of the Creative Commons Attribution Non-Commercial No Derivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>INTRODUCTION</p> <p>The fossil fungi imperfecti from the Deccan intertrappean beds of Mohgaonkalan. Mahabale (1969) has recorded <i>Diplodia rodei</i>. Four different fossil pycnidia namely <i>Palaephoma intertrappea</i>, <i>Mohgaonidium deccani</i>, <i>Mohgaonidi deccani</i>, <i>Diplodia sahnii</i> and <i>Deccanodia eocenium</i> have been reported by Singhai (1974). Above pycnidia are from the Deccan Intertrappean beds of Mohgaonkalan in M.P. Singh and Patil (1978) reported the pycnidia <i>Palaeocylosphaera intertrappea</i>, <i>Rabenharstinidium intertrappeum</i>, <i>Hendersonula mohgaoense</i>, <i>Sarcophoma deccani</i> belonging to Coelomycetes. Barlinge and Paradkar (1979) reported the Deuteromycetous pycnidia <i>Botryodiplodia mohgaoensis</i> and <i>Ascochytilis intertrappea</i> from the same beds of Mohgaonkalan. Dixit (1984) has reported same type of fructifications from the same beds.</p> <p>Chawhan (1987) described three different fungal pycnidia of fungi imperfecti from Nagpur. They are <i>Palaeosclerotipsis intertrappea</i>, <i>Phutalites deccani</i> and <i>Astermellites deccani</i>.</p> <p>Here a pycnidium showing affinities to form order Sphaeropsidales of fungi imperfecti is described.</p>

METHODS AND MATERIAL

The Material is black in colour. The preservation is fine regarding cellular details. The material is studied by taking peel sections.

RESULTS AND DISCUSSION

Description

While observing the transverse sections of fossil leaf (*Loganiophyllum mohgaonse*), fungal mass with pycnidia was observed (Fig. 2(1) and (2)). Pycnidia appear as small black dots which measures $84 \mu - 90 \mu \times 65 \mu - 70 \mu$ in size. Pycnidia have different shapes. Some are round while others are half moon or semicircular in shape. (Fig. 2(1) and (2); Text-figs. 2, 4 and 5).

Semicircular pycnidia are empty and do not show any fungal spores. (Fig. 2(1); Text-fig. 2). Some of them are found completely embedded in the mesophyll of leaf while some are coming outward. (Fig. 2(4); Text fig. 4). They open to the exterior by definite ostiole. (Fig. 2(1); Text-fig. 2). These fungal bodies consist of compact mycelium. Mycelium is branched, septate and multicellular. It is dark coloured and form pseudoparenchymatous fungal tissue. (Fig. 2(2); Text-fig. 5). The wall of the pycnidium is made of pseudoparenchymatous (Text-fig. 3) fungal tissue which measure 12 to 24μ in thickness. Conidiophores arise from the cells of inner wall of pycnidium. The conidiophores are branched and bear bicelled dark coloured conidia. (Fig. 2(3); Text-figs. 4 and 5). These are elongate to ovoid and measure $6-8 \times 2.6-4 \mu$ in size.

Identification

As the only asexual stage is found the fungus is placed under Deuteromycotina. Deuteromycotina was classified by Saccardo (1880-1886) into three orders

- (1) Moniliales or (Hyphomycetales) for genera which formed conidiophore or conidia directly on the hyphae.
- (2) In Melanconiales, conidia are produced in saucer or disc shaped fruit bodies "Acervuli".
- (3) Sphaeropsidales for members producing conidia in pycnidia.

Grove (1935) recognised two classes in Deuteromycotina. He characterised Hyphomycetes by those fungi with conidia that are formed within a cavity of the substrate in which fungus grows. This class

(Coelomycetes) now includes all immersed to superficial pycnidia and acervular fungi. The Coelomycetes is further divided into form orders Melanconiales in which the fructification are acervuli and form order Sphaeropsidales in which fructifications separate, aggregated, spherical, discoid or flattened pycnidia or stomata (Sutton, 1973). Accordingly the present specimen described comes under the form order Sphaeropsidales as the fructifications are not acervuli but are separate pycnidia.

Ainsworth (1973) has provided the key to the classes of Deuteromycotina. He classified Deuteromycotina into.

- 1) Blastomycetes: Characteristic true mycelium lacking or not well developed.
- 2) Hyphomycetes: Mycelium sterile or bearing spores directly or on sporophores which may be variously aggregated but not in pycnidia or acervuli.
- 3) Coelomycetes: Spores in pycnidia or acervuli.

Recently in 1988, Alexopoulos, revised the classification with slight changes in Ainsworth's classification. Key given by Alexopoulos is as follows.

- A - Some consisting of yeast cells with or without pseudo mycelium, true mycelium, if present, not well developed - Blastomycetidae.
- AA- Some consisting of well developed separate hyphae --B, BB.
- B - Reproduction by means of conidia borne in pycnidia or acervuli -- --- --- Coelomycetidae.
- BB - Conidia when formed, not borne in pycnidia or acervuli Hyphomycetidae.

From the key given above, the present fossil fungal fructification comes under form subclass, Coelomycetidae.

Those forms producing pycnidia are placed in form order sphaeropsidales and those producing acervuli are placed in form order Melanconiales by Alexopoulos. Fossil fungus shows conidia in pycnidium and hence it is referred to a form order Sphaeropsidales. Form order Sphaeropsidales is divided into form families Sphaeropsidaceae and Necrioidaceae, Leptostromataceae and Excipulaceae by Alexopoulos.

As pycnidia of fossil fungal specimen are dark coloured, with definite opening (ostiole), it is placed under form family Sphaeropsidaceae.

Thus above mentioned fungus with pycnidia comes under sphaeropsidales (As fructification are produced in pycnidia).

In sphaeropsidales, the present fungal pycnidium is comparable with *Ascochyta*, *diplodia*, *diplodina* and *Botryodiplodia*, because of bicelled nature of conidia.

Present fungal specimen differs from *Ascochyta* in having small sized conidia and they are hyaline. In *diplodina* also the conidia are hyaline. (Conidia are dark coloured in present fungus).

Present fossil specimen shows presence of dark coloured conidia like those of *Diplodia* but in *Diplodia* conidia are more longer than 15 μ (6-8 μ long in present specimen) and conidiophores are needle shaped (while conidiophores are branched in present specimen).

After eliminating *Ascochyta*, *Diplodina*, *Diplodia*, present specimen is more closer to *Botryodiplodia* in having

- 1) dark coloured pycnidia.
- 2) pycnidia with ostiole,
- 3) branched conidiophore,
- 4) Conidia dark, 2-celled, ovoid to elongate in shape.

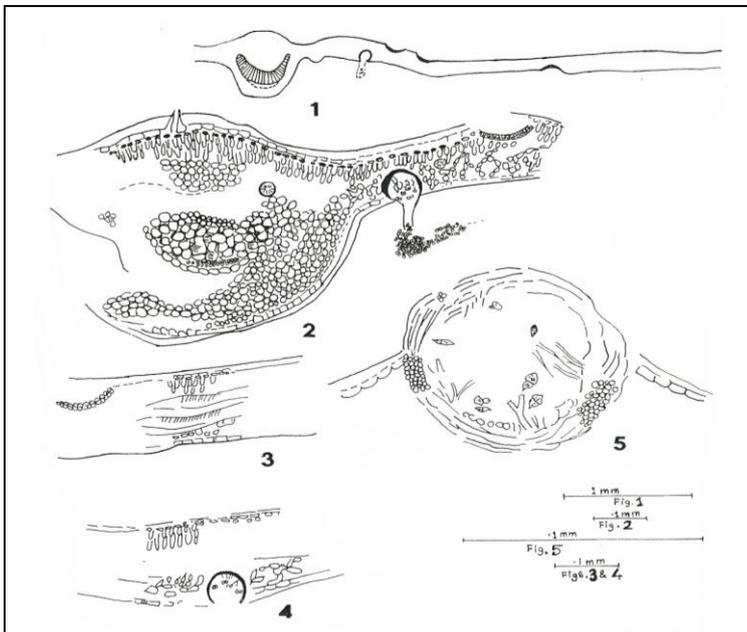
Fossil fungal specimen is compared with following reported fossil genera.

It differs from *Diplodia rodei*, (Mahabale, 1969) in the following characters. Conidia of *Diplodia rodei* are larger, 17.5 - 18.0 x 7.5 in size, purple in colour, while the present fungus shows smaller conidia which measure 6-8 x 2.6-4 μ and they are dark.

In *Ascochytilis intertrappea* (Barlinge and Paradkar, 1979), pycnidia are ostiolate, mycelium is septate and branched, conidia are 2-celled, but it differs from present fossil specimen, in the following respect.

1. Conidia are elongate, hyaline.
2. They are small. 3.5 x 1.0 - 1.5 μ in size.

It is also compared with fossil genus *Botryodiplodia mohgaonensis* (Barlinge and Paradkar, 1979) in which pycnidia are 100-114 x 70-80 μ in size, bicelled, conidia dark, 7-8 x 3.0-3.5 μ in size, fusiform with striations, while in present fungus, pycnidia are 84-90 x 65 -70 μ in size, conidiophores are branched, conidia are dark, bicelled, 6-8 x 2.6-4 μ in size, but without striations, hence it is named as *Botryodiplodia deccanii* sp. nov. the specific name being after the horizon.



Text Fig. 1: *Botryodiplodia deccanli* sp. Nov

- (1) T.S. leaf showing pycnidia;
- (2) Pycnidium showing distinct ostiole.
- (3) Pseudoparenchymatous nature of wall of pycnidium;
- (4) Pycnidium showing branched conidiophores;
- (5) Pycnidium magnified showing branched conidiophore and bicelled conidia.

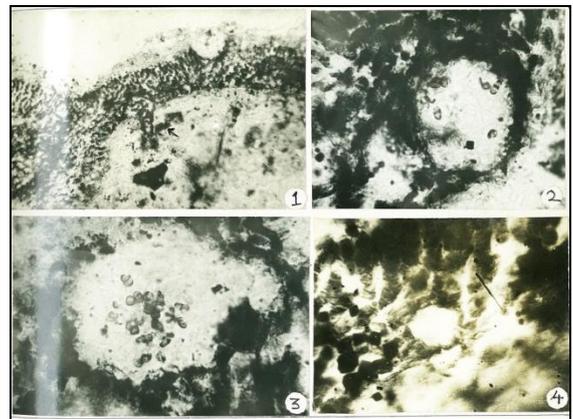


Fig. 2: *Botryodiplodia deccanli* sp. Nov

- (1) Leaf showing upper empty half moon shaped pycnidium and lower round, ostiolate pycnidium with fungal mass coming out . arrow) X 200;
- (2) Round pycnidium showing pseudoparenchymatous fungal tissue and bicelled dark coloured conidia with fungal mycelium. X 750;
- (3) Pycnidium with bicelled dark conidia. X 750;
- (4) Empty pycnidium completely embedded in the mesophyll tissue of leaf. X 750.

Thus the systematic position of the present fossil fungus will be as follows –

Botryodiplodia deccanii sp. nov.

Division	- Eumycota
Subdivision	- Deuteromycotina.
Form Class	- Deuteromycetes.
Form subclass	- Coelomycetidae.
Form order	- Sphaeropsidales.
Form family	- Sphaeropsidaceae.
Form genus	- <i>Botryodiplodia</i>
Form species	- <i>Botryodiplodia deccanii</i> sp. Nov.

Diagnosis

Botryodiplodia deccanii sp. nov.

Pycnidia black coloured and compact, round, halfmoon or semicircular in shape. Semicircular pycnidia open to exterior by ostiole and measures 84-90 x 65 -70 μ Hyphae branched septate and multicellular forming pseudoparenchymatous fungal tissue, wall of pycnidium measure 12-24 μ in thickness, conidiophores branched, conidia bicelled, dark coloured, elongate to ovoid 6-8 x 2.6-4 μ in size.

Holotype	: SDP Department of Botany, Shivaji Science, Nagpur
Horizon	: Deccan Intertrappean Series of India.
Locality	: Mohgaon-Kalan, Chhindwara District.
Age	: Upper Cretaceous.

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