Diversity, distribution and taxonomy of Corynespora associated with Cannabaceae and Ulmaceae

Kumar S1* and Singh R2

1Department of Forest Pathology, Kerala Forest Research Institute, Peechi – 680653 (Kerala), India.
2Centre of Advanced Study in Botany, Institute of Science, Banaras Hindu University, Varanasi–221005 (U.P.), India.


Abstract

Corynespora tremiae sp. nov. was discovered on dead twigs of Trema orientalis (Cannabaceae) on the campus of DDU Gorakhpur University, Gorakhpur, Uttar Pradesh (U.P.) India. It is described, illustrated, discussed and compared with morphologically similar taxa reported on Cannabaceae and Ulmaceae. A comparative table to species of Corynespora on Cannabaceae and Ulmaceae is provided. Descriptions and nomenclatural details are deposited in MycoBank.

Key words – anamorphic fungi – Corynespora – morphotaxonomy – new species

Introduction

The hyphomycetous genus Corynespora (Ascomycota, Dothideomycetes, Pleosporales, Corynesporascales) was established by Güssow (1906). The genus causes diseases on plants, predominantly in the tropics and subtropics, including India. The fungus is characterized by producing distoseptate conidia with or without a distinct hilum and monoblastic conidiogenous cells. Most of the species of the genus are phytopathogenic while some species are reported as endophytes and saprobes.

To date, almost 200 species of Corynespora have been recorded (www.Indexfungorum, 30 October 2016). In the past decade, Indian mycologists have described several novel species (Kumar et al. 2007, 2008, 2012, 2013, Pal et al. 2007, Singh & Kamal 2011, Singh et al. 2000a, b, 2007a, b, 2013, 2014). McKenzie (2010) and Siboe et al. (1999) provided synoptic tables for the main morphological features of Corynespora spp.

A hyphomycete, corresponding to the current concept of Corynespora, was collected on Trema orientalis from Gorakhpur University Campus, Uttar Pradesh, India during micromycological surveys in 2014. It was clearly different from morphologically similar Corynespora species previously described on Cannabaceae and Ulmaceae, and it is therefore proposed here as a new species, Corynespora tremiae.

Materials & Methods

Specimens with clear visible symptoms of fungi on the dead twigs were collected. The
samples were carried to the laboratory and processed by following the standard techniques (Hawksworth 1974, Savile 1962). The dried and pressed specimens were placed in polyethylene bags and then kept in paper envelopes along with collection details. Photographs of infection spots on host twigs were taken using a Sony DSC-5730 camera. Usually more than one photograph was taken for each fungal propagule and merged together into a single photograph in Photoshop (Ver. 7.0) using calibrated scale. The specimens for microscopic observation were prepared by hand sectioning and scraping. Morphological descriptions are based on slide preparations mounted in 4% KOH, lactophenol (0.01%) and cotton blue (Kirk et al. 2008) from infected area of the twigs. Observations were made using an Olympus BX-51 light microscope and a connected Syntek USB camera. The microphotographs were stored in electronic format (TIF). Detailed observations of morphological characters were carried out at different magnifications (400× and 1000×). Measurements were made of 30 conidia, hila, and conidiophores. Morphotaxonomic determinations were made with the help of current literature and available resident expertise. The holotype has been deposited in the Ajrkar Mycological Herbarium (AMH), Agharkar Research Institute (ARI), Pune, Maharashtra (MS), India and an isotype was retained in the mycological herbarium of Birbal Sahni Institute of Palaeobotany (BSIPMH), Lucknow for further reference. The systematics of the taxon is given in accordance with Ellis (1971, 1976), Cannon & Kirk (2007), Kirk et al. (2008), Seifert et al. (2011), Farr & Rossman (2015). Faces of fungi numbers are provided (Jayasiri et al. 2015).

**Fig 1** – *Corynespora tremae* (AMH 9703, holotype). a, Symptoms on dead twigs of *Trema orientalis*, b, Colonies enlarged view. – Bar b = 20 mm.
**Fig 2** – *Corynespora tremae* (AMH 9703, holotype). a–d, Conidiophores, e–h, Conidia, i, Germinating conidium. – Bars = 20 µm.
Table 1 Conidiophores and conidial morphology of *Corynespora* spp. recorded on Cannabaceae and Ulmaceae.

<table>
<thead>
<tr>
<th>Fungus</th>
<th>Conidiophores</th>
<th>Conidia</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. cassicola</em> (Wei 1950)</td>
<td>unbranched, up to 9 successive cylindrical proliferations, pale to mid brown, 110–850 × 4–11 µm</td>
<td>unbranched, 4–20-distoseptate, subhyaline to pale olivaceous, 40–220 × 9–22 µm, hilum thickened</td>
<td><em>Trema micrantha</em> (L.) Blume (Cannabaceae)</td>
</tr>
<tr>
<td><em>C. holopetae</em> (Jain et al. 2002)</td>
<td>branched, up to 5 successive cylindrical proliferations, mid olivaceous, 49–314 × 5–9 µm</td>
<td>branched, up to 17-distoseptate, mid olivaceous, 23–234 × 3.6–19.5 µm, hilum thickened</td>
<td><em>Holoptelea integrifolia</em> Planch. (Ulmaceae)</td>
</tr>
<tr>
<td><em>C. holopteleicola</em> (Kumar et al. 2012)</td>
<td>branched, 2–4-euseptate with 0–4 successive cylindrical proliferations, brown, 120–255 × 5–20 µm</td>
<td>unbranched, 0–11-distoseptate with 0–2 distinct septa, olivaceous brown, 33–148 × 5–20 µm, hilum unthickened</td>
<td><em>Holoptelea integrifolia</em> (Ulmaceae)</td>
</tr>
<tr>
<td><em>C. tremae</em></td>
<td>unbranched, 3–5-septate with 2–4 successive cylindrical proliferations, brown, 120–180 × 3–4.5 µm</td>
<td>unbranched, 5–20-distoseptate, olivaceous brown to light brown, 50–160 × 4–12 µm, hilum thickened</td>
<td><em>Trema orientalis</em> (L.) Blume (Cannabaceae)</td>
</tr>
<tr>
<td><em>C. tremicola</em> (Sharma et al. 2002)</td>
<td>branched, 3–9-septate with 0–11 successive cylindrical proliferations, light olivaceous brown, 190–612 × 7.5–8.5 µm</td>
<td>unbranched, 1–12-distoseptate, light olivaceous brown, 104–296 × 11–16 µm, hilum unthickened</td>
<td><em>Trema orientalis</em> (Cannabaceae)</td>
</tr>
<tr>
<td><em>C. ulmacearum</em> (Singh et al. 2000)</td>
<td>branched, 1–3 successive cylindrical proliferations, light olivaceous, 43–161 × 3.5–4.8 µm</td>
<td>unbranched, 2–16-distoseptate, sub hyaline to light olivaceous, 15–106 × 3.5–10 µm, hilum unthickened</td>
<td><em>Trema orientalis</em> (Cannabaceae)</td>
</tr>
</tbody>
</table>

Results

Taxonomy

*Corynespora tremae* Sham. Kumar & Raghv. Singh, sp. nov. Figs 1–2

MycoBank 814535; Facesoffungi number: FoF 02664

Etymology – *tremae* in reference to the host genus.

Asexual morph, hyphomycete, Infection spots discrete on dead twigs, brown to blackish. Colonies effuse, greyish to blackish. Mycelium internal, thin-walled, smooth, branched, olivaceous to brown. Stromata absent. Conidiophores arising singly as lateral branches from superficial hyphae, solitary or in fascicle of 2, macronematous, mononematous, cylindrical, erect to procumbent, straight to flexuose, unbranched, smooth, thick-walled, 4–6-septate with 2–4 successive cylindrical proliferations, brown, 120–180 × 3.5–4.5 µm, basal cell swollen. Conidiogenous cells integrated, terminal, monotretic, scars unthickened, 2.5–4.5 µm. Conidia acrogenous, dry, solitary, simple, thin-walled, smooth, straight to slightly curved, usually obclavate
to obclavate-cylindrical, 5–20-distoseptate with 2–6 transverse band-like eusepta, light brown to brown, 50–160 × 4–12 µm, apex obtuse to rounded, hilum thickened, 2.5–5 µm, germinating conidium present, germ tubes 2 × 115 µm long. Sexual morph: Undetermined.

Known distribution – India (this paper).

Material examined – India, Uttar Pradesh, DDU Gorakhpur University, Gorakhpur, University Campus, 26° 45' N, 83° 24' E, on dead petiole of Trema orientalis (L.) Blume (Cannabaceae), 16 November 2014, Shambhu Kumar, AMH 9703 (holotype), BSIPMH 047 (isotype).

Discussion

Corynespora tremae is compared with Corynespora species reported on both families Cannabaceae and Ulmaceae because some Corynespora hosts have been transferred from Ulmaceae to Cannabaceae on molecular grounds. Literature survey revealed that five species of Corynespora have been described on different hosts of these families (Table 1).

The conidia of C. tremae are shorter and thinner than those of C. cassicola, C. holopetae and C. tremicola but longer and thicker with a thickened hilum when compared to C. ulmacearum. The conidiophores of C. tremae are much shorter and thinner when compared to C. cassicola, C. holopetae and C. tremicola and longer than C. ulmacearum.

The conidia of C. tremae show resemblance to C. holopteleicola but differ due to presence of thinner, more septation and thickened hila. The conidiophores of C. tremae are much shorter and thinner than those of C. holopteleicola.

Acknowledgements

The authors express their sincere gratitude to the Director, Kerala Forest Research Institute, Peechi, Kerala for encouragement and necessary facilities. The authors thank anonymous reviewers for reviewing the manuscript. Thanks are also due to the Curator, Ajrekar Mycological Herbarium (AMH), Agharkar Research Institute (ARI), Pune (MS) for depositing fungal specimens and providing accession numbers. Science and Engineering Research Board (SERB), Department of Science & Technology (DST), Govt. of India, New Delhi is very much acknowledged for financial assistance to author SK as Fast Track Young Scientist Start-up Project grant (SB/YS/LS-288/2013).

References


