



## Diversity and taxonomy of phytopathogenic *Cladosporium* on Rubiaceae

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### Abstract

This paper deals with the diversity and taxonomy of phytopathogenic *Cladosporium* on family Rubiaceae including the addition of a new species (*C. mitragynae*) causing foliar disease on *Mitragyna pervifolia* (Rubiaceae). The present species is described, illustrated and compared with closely related species. This species is distinctly different from earlier reported species having a less developed stroma, shorter conidiophores with less septa and shorter and smooth conidia as compared to previously described species.

**Key words** – anamorphic fungi–*Cladosporium*–foliicolous– new species

### Introduction

The asexual hyphomycete genus *Cladosporium* was established by Link (1816). Presently it is one of the largest and most heterogeneous genera of hyphomycetes, currently encompassing more than 772 names (Dugan et al. 2004). The genus *Cladosporium* (incl. *Heterosporium*) is characterized and distinguished from other *Mycosphaerella* asexual morphs, by its unique type of scars and conidial hila. The species of the genus causes foliar diseases of plants in tropical and subtropical regions.

The area of northeastern Terai belt of Uttar Pradesh is a subtropical region covering parts of Himalayan foot hills and has various forms of vegetation and forests. Due to congenial combination of topography, climatic and environmental conditions, the areas support the growth and development of fungi in general and foliicolous asexual fungi in particular. During our survey of the forest region of the region Uttar Pradesh, a large number of collections showing foliar diseases have been made. Critical morphological examination revealed *C. mitragyna* sp. nov. causing foliar disease of *Mitragyna pervifolia* (Rubiaceae) and is introduced here.

### Materials & Methods

Surface scrapping and free hand cut sections of infected leaf samples, collected from northeastern Uttar Pradesh, were taken from infection spots and mounted in cotton-blue lactophenol mount (Purvis et al. 1966) for microscopic examination. Illustrations have been made with a camera-lucida on a compound microscope and measurements were made by micrometry. Morphotaxonomic determinations were made with the help of current literature and available resident expertise. The

holotype has been deposited in Herbarium Cryptogamiae Indiae Orientalis (HCIO), Indian Agricultural Research Institute (IARI), New Delhi and an isotype was placed in the herbarium of Botany Department of D.D.U. Gorakhpur University, Gorakhpur for further reference. The systematics of the taxa is given in accordance with Cannon & Kirk (2007), Kirk et al. (2008), and Index Fungorum (Index Fungorum 2015). Description and Nomenclatural details were deposited in MycoBank (www. MycoBank.org.) and Facesoffungi number (FoF 00713).

## Results

### Taxonomic Descriptions

***Cladosporium mitragynae*** H.D. Bhartiya, N. Kumari, Sham. Kumar & R. Singh, **sp. nov.** (Figs 1 MycoBank MB810947; Facesof fungi number: FoF 00713)

Etymology – specific epithet *mitragynae* in reference to host genus.

**Infection spots** amphigenous, subcircular to irregular, later coalescing to form large patches, greyish white colonies, amphiphylous, effuse, olivaceous brown. **Mycelium** external, branched, septate, smooth walled, light olivaceous, 8 µm wide. **Sexual morph:** Undetermined. **Asexual morph:** hyphomycetous. **Stromata** poorly developed, rare (few cells), irregular, pseudoparenchymatous, light brown, 14–21 µm wide. **Conidiophores** 55–205 × 3.5–5 µm, arising mostly single or in loose fascicles from stromata and mycelial hyphae, macronematous, mononematous, 3–8 transversely septate, branched, erect to suberect, straight to flexuous, mostly smooth-walled, swollen at the apex, dark olivaceous. **Conidiogenous cells** integrated, terminal to intercalary, polyblastic, sympodial, cicatrized, distinctly conidial scars. **Conidia** 4–24 × 3.5–5 µm dry, holoblastic, acropleurogenous, variable in shape and size, cylindrical, subspherical, fusiform, apex subacute to obtuse, base rounded, obconic-truncate, 0–3 transversely septate, sometime protuberant, hila dark, distinct and thickened, unbranched, smooth walled, light brown.

Sexual morph: Undetermined.

**Type** – India, Uttar Pradesh, Mahrajganj, Nichlaul forest, on living leaves *Mitragyna pervifolia* Roth. (Rubiaceae), 10 Feb 1999, N. Kumari, HCIO 43146 (**holotype**); GPU Herb No. 8526 (**isotype**).

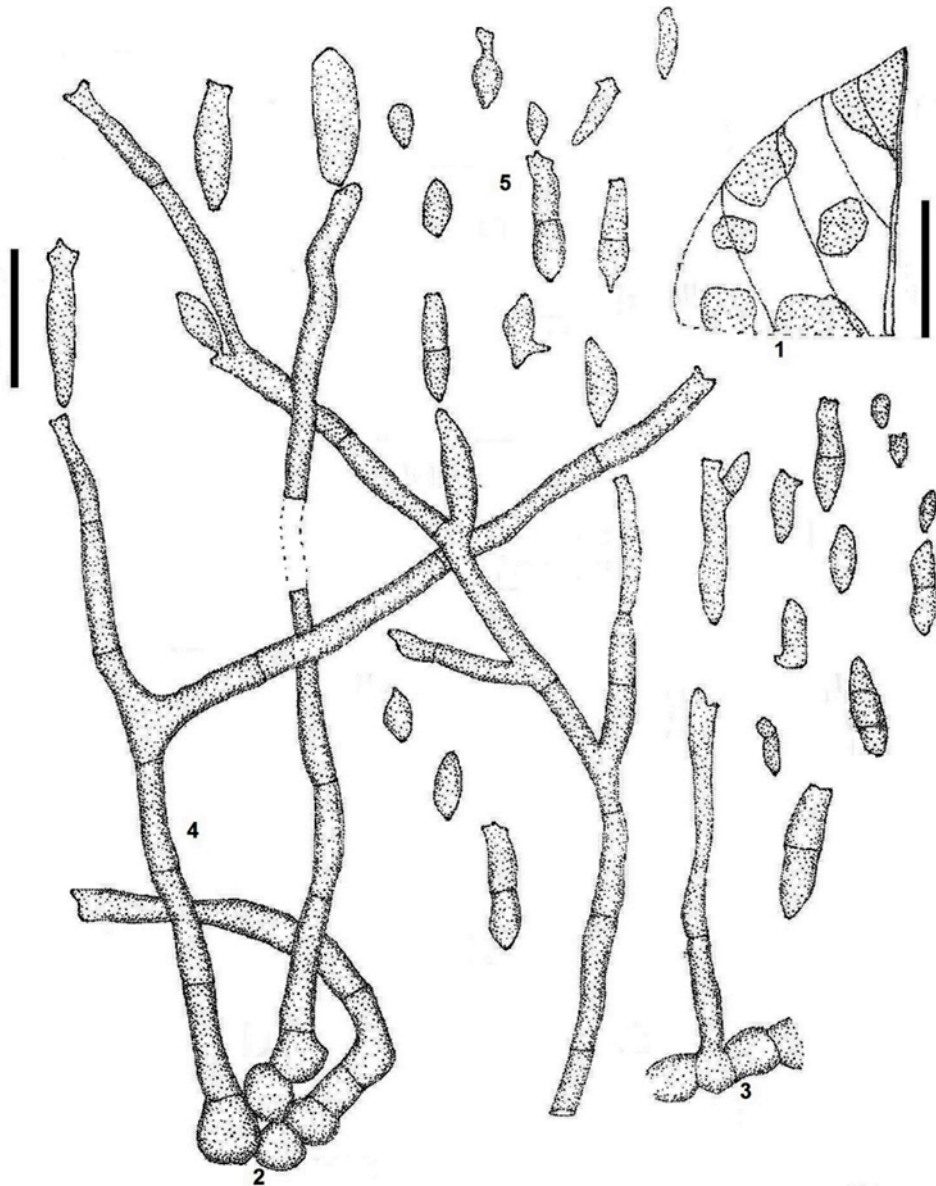
**Notes** – A survey of the literature revealed that there is no record of *Cladosporium* on the host. Only one species, *C. galii* (Mułenko & Kozłowska, 2004) has been reported (in Bensch et al., 2012) on leaves of *Galium odoratum* in the family Rubiaceae from Poland. Therefore comparison is made with this taxon. From comparative analyses (Table 1), it is clear that the stroma is well-developed *C. galii* while less developed in the new species. The conidiophores of *C. mitragynae* are shorter and have fewer septa (55–205 × 3.5–5 µm, 3–septate) as against to *C. galii* (25–280 × (2.5–) 4.5–8(–10), 1–4 septate). The conidia are shorter (4–24 × 3.5–5 µm) and smooth-walled in *C. mitragynae* while longer (6–30(–40) × (2.5–) 3–6.5 µm) and verruculose in *C. galii*. Therefore on the basis of comparative analyses we concluded *C. galii* is a new species.

### Key to *Cladosporium* species reported on Rubiaceae

1. Stroma well developed (37.5–82.5(–100) µm).....	3
2. Stroma less developed (14–21 µm).....	4
3. Conidiophores 25–280 × (2.5–) 4.5–8(–10), 1–4-septate.....	5
4. Conidiophores 55–205 × 3.5–5 µm, 3-septate.....	6
5. Conidia 6–30(–40) × (2.5–) 3–6.5 µm, verruculose.....	<i>C. galii</i>
6. Conidia 4–24 × 3.5–5 µm, smooth,.....	<i>C. mitragynae</i>

**Table 1 Comparison of *Cladosporium* spp. on Rubiaceae**

<i>Cladosporium</i> spp.	Stroma	Conidiophores	Conidia
<i>C. galii</i>	37.5–82.5(–100) $\mu\text{m}$	25–280 $\times$ (2.5–) 4.5–8(–10) $\mu\text{m}$ , 1–4 septa	6–30(–40) $\times$ (2.5–) 6.5 $\mu\text{m}$ , verruculose
<i>C. mitragynae</i>	14–21 $\mu\text{m}$	55–205 $\times$ 3.5–5 $\mu\text{m}$ , 3–8 septate	4–24 $\times$ 3.5–5 $\mu\text{m}$ smooth



**Figs 1–***Cladosporium mitragynae*. 1. Infection spots. 2. Stroma. 3. Mycelium. 4. Conidiophores. 5. Conidia. Bars 1= 20 mm, 2–5= 20  $\mu\text{m}$ .

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