

## ***Gyrothrix kigeliae*: A novel setose fungus from Central India**

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### **ABSTRACT**

A new species of anamorphic setose dematiaceous hyphomycete, *Gyrothrix kigeliae* was isolated from dead leaves of *Kigelia africana* (Lam.) Benth. collected from Dr. H. S. Gour University campus, Sagar M. P. India, is described in this paper. The new species is recognized based on morphological comparison with hitherto described species in the genus. *Gyrothrix kigeliae* exhibits both astromatic and stromatic colonies on the substrate and differs from other species by smaller conidiophore and conidia. Besides photomicrographic illustration and SEM pictures of the fungus are provided.

**KEYWORDS:** Leaf litter, setae, *Gyrothrix*, dematiaceous hyphomycetes

### **INTRODUCTION**

Forest ecosystem consists of a heterogeneous group of plant residues which include coarse fine deadwood, fallen leaves and needles together making up dead organic material (Didion *et al.*, 2014). Senescent leaves fallen during winter create the first stratification of the litter in deciduous forest. Estimation shows that leaf litter produced by every deciduous tree ranges from 3-5 tons per hectare in cold and warm temperate forest (Bray and Gorham, 1964). To decompose the available biopolymers, fungal communities run through a clear succession of taxa (Fukasawa *et al.*, 2009; Purahong *et al.*, 2016; Voříšková and Baldrian, 2013). Decomposition of litter and wood is mainly driven by fungi (Allmer *et al.*, 2009; Baldrian, 2017; Bässler *et al.*, 2010; Purahong *et al.*, 2016; Tláskal *et al.*, 2016). Filamentous anamorphic fungal genera such as *Circinotrichum* Nees and *Gyrothrix* (Corda) Corda are reported to grow on a specific state of leaf decomposition, indicating efficient role of physical factors in the apparent host specialization (Pirozynski and Patil, 1970).

The genus *Gyrothrix* is characterized by superficial, effuse, grayish brown sporodochial or stromatic colonies, erect setae which are repeatedly branched at their apices, micronematous, conidiophores and solitary, hyaline, smooth, aseptate conidia developing on sympodial conidiogenous cells. (Ellis, 1971).

### **MATERIALS AND METHODS**

Infected leaves were collected and taken to the laboratory where Lactophenol cotton blue was used as the mounting medium for slide preparation. Detailed study of morphological characters was carried out under a light microscope. Micrometry of conidia, conidiophores and setae was recorded at 400 X magnification (30 each). Exact measurement and detailed morphology of the fungus was recorded by scanning electron microscope (SEM). Samples were not subjected for preparative treatment for SEM studies because they were previously dried (Pinar *et al.*, 2015). For this purpose the specimens were coated with thin layer of gold-palladium using Denton Vacuum and examined using NOVA NANO SEM 450. The holotype of the novel species was deposited in Ajrekar Mycological Herbarium (AMH), Agharkar research institute Pune, India and an isotype was deposited in Mycological Herbarium (RSM), Department of

Botany Dr. Hari Singh Gour Central University Sagar, M. P. India.

### **TAXONOMIC DETAILS**

*Gyrothrix kigeliae* S. Bhardwaj, R. S. Thakur & A.N. Rai sp. nov. **Figs. 1-3.**

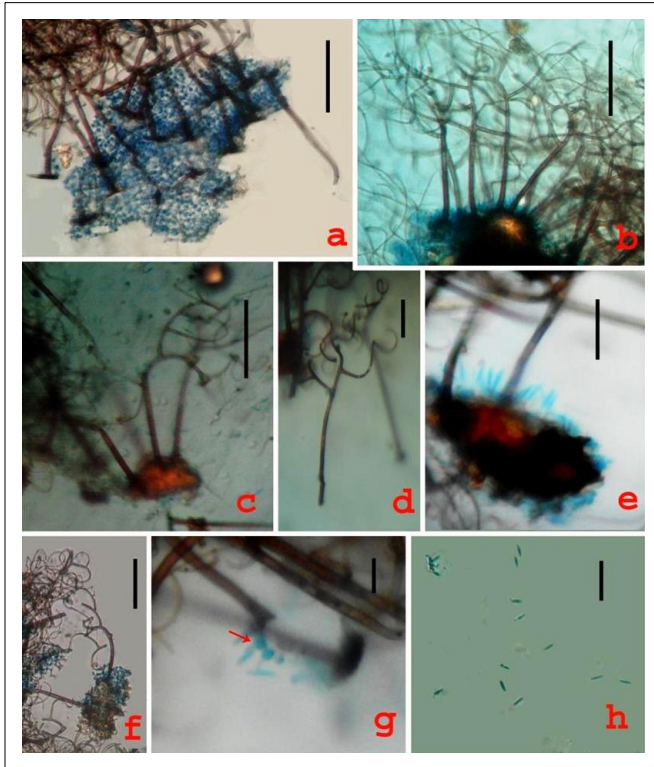
Mycobank no.: MB 829953

**Etymology:** The species name *kigeliae* has been given after the name of the host *Kigelia*.

**Diagnosis:** The newly named species *Gyrothrix kigeliae* differs from the other *Gyrothrix* species by its



**Fig. 1 (a-b) *Gyrothrix kigeliae*: Symptoms on dried leaves.**



**Fig. 2 (a-h) *Gyrothrix kigeliae*:** a. Astromatic setae with conidiophore and mycelium; b-c, e. Stromatic setae; d, f. Coiled Setae; g. Attachment of conidium with conidiophores; h. Conidia. Scale: a-f=20  $\mu$ m; g-h=10  $\mu$ m.

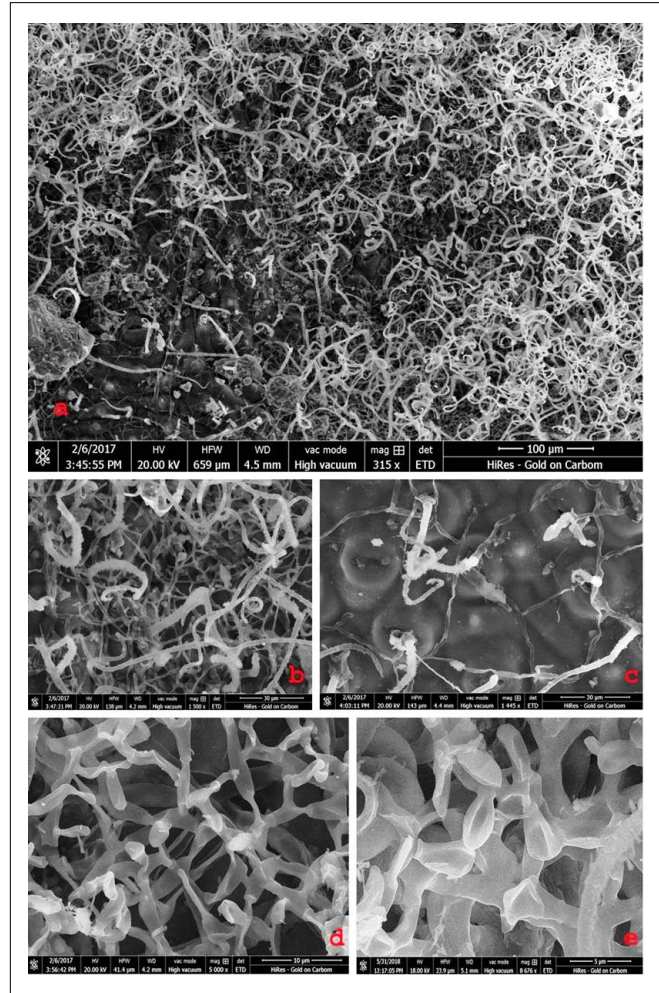
symptomatology, nature, position of stroma and profusely branched spring like coiled setae.

**Taxonomic description:** Leaf lesion amphigenous, mostly found on lower surface near veins of the leaves, dusty brown, Colonies amphiphylous, effuse, velvety. Light brown 2.5-5  $\mu$ m thick mycelium partly immersed, partly superficial, creeping on surface of the substratum, with stromata partly immersed, 17.5-105 x 15-75  $\mu$ m diam. Setae erect septate, repeatedly branched in the above half, verrucose, curved or coiled at the tip, mostly solitary arising from the superficial mycelium, sometimes from the stroma, swollen at the base, dark brown to pale brown towards the apex, 100-250 x 2.5-5  $\mu$ m in size, 7.5-12.5  $\mu$ m wide at the base. Conidiophores micronematous, irregularly branched, hyaline, smooth, 2.5-4.3 x 1.5-2  $\mu$ m in size, often reduced to conidiogenous cells. Conidiogenous cells holoblastic, sympodial. Conidia solitary, slightly curved, hyaline, smooth, aseptate, 5-7.5 x 1.25-2  $\mu$ m in size.

**Specimen examined:** On dried dead leaves of *Kigelia africana* (Lam.) Benth. (*Bignoniaceae*) from Botanical Garden, Dr. H. S. Gour Central University Sagar Madhya Pradesh, India, Jan. 2018, leg. S. Bhardwaj, (Holotype, AMH-9943, Isotype RSM-2).

## DISCUSSION

The new species, *Gyrothrix kigeliae*, is morphologically different from hitherto described species of *Gyrothrix*. However, *Gyrothrix podosperma* (Corda) Rabenhorst (Ellis, 1971), *G. citricola* Piroz., and *G. ramosa* Zucconi & Onofri



**Fig. 3 (a-e) *Gyrothrix kigeliae* SEM images:** a-b. Mass of setae at 315 X and 1500 X magnification, respectively; c. Showing origin of setae from mycelium; d-e. Conidiogenous cells and Conidia at 5000 X and 8676 X magnification, respectively.

(Zucconi and Onofri, 1989) show some similarity with the new species but the latter shows a distinct stromatic colony with smaller conidiophores and conidia as compared to other species (**Table I**). Literature survey revealed that no other species of *Gyrothrix* has earlier been reported on *Kigelia africana* (Lam.) Benth. *Gyrothrix kigeliae* differs from the other species in symptomatology, nature, position of stroma, and the presence of profusely branched spring like coiled setae.

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**Table 1:** Comparative account of *Gyrothrix kigeliae* sp. nov. with similar taxa in the genus

Species	Leaf spots and Colonies	Stromata	Setae	Conidiophores/ Conidiogenous cells			Conidia		
				Structure	Colour	Size (in $\mu\text{m}$ )	Structure	Colour & septation	Size (in $\mu\text{m}$ )
<i>Gyrothrix podosperma</i> (Corda) Rabenhorst (Ellis, 1971)	Dark reddish brown, up to 5mm. diam.	Stromata present, but immersed, pseudo-parenchymatous	4-5 times sub dichotomously branched, basal swelling 120-260 x 3.5- 4.5 $\mu\text{m}$	Micronema-tous, irregular, smooth	Subhyaline	6-14 x 3-4 $\mu\text{m}$	Straight or slightly curved	Hyaline & 0-septation	8-16 x 1.5- 2 $\mu\text{m}$
<i>G. citricola</i> Piroz. (Pirozynski, 1962)	Circumscribed whitish	Absent	Erect, flexuous, smooth, septate, brown at the base, gradually tapering, subhyaline one time branched or unbranched, 240 x 3-4 $\mu\text{m}$	Obclavate to lageniform, thin walled	Subhyaline	5.5-9 x 2.5-3.5 $\mu\text{m}$	Cylindrical, straight, slightly curved smooth, 0-septation	Hyaline & 0-septation	11-13.5 x 1.8- 2 $\mu\text{m}$
<i>G. ramose</i> Zucconi & Onofri (Zucconi and Onofri, 1989)	Effuse, blackish brown or black	Absent	Erect, straight, septate, verrucose, branches circinate 150 x 3-3.5 $\mu\text{m}$	Micronema-tous, flexuous, smooth	Subhyaline to pale brown	6-9 x 3-4.5 $\mu\text{m}$	Straight, slightly curved, smooth, 0-septation	Hyaline & 0-septation	14-19 x 2-3 $\mu\text{m}$
<i>G. kigeliae</i> sp. nov.	Effuse, dusty brown velvety, mostly found near venation of leaves, with velvety growth, amphigenous, amphiphilous	Stroma present, partly immersed and partly superficial 17.5-105 x 15-75 $\mu\text{m}$	Setae 1-5 times repeatedly branched, dark brown to pale brown towards the ends, verrucose, septate, rarely septate and coiled at the tip, swollen at the base, 100-250 x 2.5-5 $\mu\text{m}$	Micronema-tous, irregular, smooth	Hyaline	2.5-4.3 x 1.5-2 $\mu\text{m}$	Solitary, straight, smooth, pointed	Hyaline & 0-septation	5-7.5 x 1.5-2 $\mu\text{m}$

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