



## Additions to foliicolous hyphomycetes genus *Pseudocercospora* from forest flora of North- Eastern Uttar Pradesh

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**Abstract:** Two new species of *Pseudocercospora* sp., viz., *P. aquatica* on *Polygonum aquaticum* (Polygonaceae) and *P. helminthostachyadis-zeylanicae* on *Helminthostachys zeylanica* (Ophioglossaceae) are described illustrated and compared with allied species. These are collected from Terai belt of North- Eastern Uttar Pradesh.

**Key Words:** Fungi, Foliicolous Hyphomycetes, *Pseudocercospora*, *zeylanicae*, *Helminthostachys*.

*Pseudocercospora* comprises several hundred species ( Hawksworth, Sutton Ainsworth, 1983), mostly transferred from *Cercospora* ( Pollack, 1987). Most species have been interpreted as host species, the majority confined to a single host genus or even to a single species, although some may have a wide host range (Deighton, 1976). The genus is particularly common in the tropics and sub-tropics. It is foliicolous and characterized by usually non-necrotic, distinct leaf spots, brown, clavate- cylindrical, septate conidia with unthickened scars corresponding with similar scars at the conidiogenous loci. In this paper two new species of *Pseudocercospora* collected from North- Eastern Uttar Pradesh are described and illustrated.

**MATERIALS AND METHODS-** Infected leaf samples were collected from forest area of North- Eastern Uttar Pradesh. The specimens were kept in polythene bags during collection. The host plants were tentatively identified in the field and their identity was confirmed later on the specimens were dried by the method used for preparing herbarium material of phanerogams. A part of each specimen was sent to HCIO (Herbarium (ryptogamiae India Orientalis, New Delhi) for accession. Symptoms were first studied with the naked eye and then with hand lens. Detailed taxonomic treatment was given by studying under compound microscope and preparing camera lucida drawings for the species including in this paper. Taxonomic determinations were made with the help of standard literature and by available experts.

**RESULTS AND DISCUSSION-** On comparing the illustrations, descriptions and measurements of the fungi under study with allied taxa, they were found to be undescribed. They are

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described below.

*Pseudocercospora aquatica* Rao (fig. 1)

Maculae amphigenae, necrotae, discratae, saepe coalescentes, veinis limitatae, orbiculares vel sub- orbiculares, superne ferrugineae, brunneae, inferne pallide, ferrugineo brunneae, 1-4 mm latis, Coloniae hypophyllae, effusae; Mycelium internum; Hyphae ramosae, septatae, laevis, tenui tunicatae, pallid- olivaceae; Stromata eumorpha, immersa, substomatibus posita, pseudoparenchymatosa, pallide brunnea, 14.50-19.50 µm diam.; Conidiophora fasciculata, macronemata, mononemata, 2-3 septata, non ramosa, laevia, apicem versus conica, cylindrica, pallide olivacea, 51.0-72.0 x 2.0-4.5 µm; Cellulae conidiogenae integratae, sympodiales, terminales, geniculatae, polyblasticae, cicatrices conidiales non incrassatae; Conidia solitaria, sicca, acropleurogena, holoblastica, obclavato-cylindrica, recta vel leniter curvata, non ramosa, 3-8 transverse septata, tenui tunicata, laevia, apicem versus acuta, basi obconico-truncata, hilo abbessea, 18.0-73.50 x 1.5-3.0 µm.

In foliis vivis Polygoni aquatici L. (Polygonaceae); leg. H.S.G. Rao; March, 1991; Kushmhi Forest, Gorakhpur (U.P.) GPU Herb. No. HK 28/2628 isotypus, HCIO 41129 holotypus.

Leaf spots amphigenous, necrotic, discrete and sometimes coalescing with each other, vein limited, circular to sub-circular, on upper surface rusty brown and light rusty brown on the lower one, upto 1-4 mm wide; Colonies hypophyllous, effuse; Mycelium of hyphae internal, branched, septate, smooth and thin walled, light olivaceous; Stromata developed, immersed, sub- stromatal, composed of pseudoparenchymatous cells, light brown, 14.50-

19.50  $\mu\text{m}$  diam.; Conidiophores arising singly or in fascicles, macronematous, mononematous, 2-3 septate, unbranched, smooth walled, geniculate, conic tip, cylindrical, light olivaceous 51.0-72.0 x 2.0-4.5  $\mu\text{m}$ ; Conidiogenous cells integrated, sympodial, terminal, polyblastic, geniculate, scars-unthickened; Conidia solitary, dry, acropleurogenous, holoblastic, obclavato-cylindrical, straight to slightly curved, unbranched, 3-8 transversely septate, smooth, thin walled, sub-hyaline, apex acute, base obconicotruncate, hilum absent, 18.0-73.50 x 1.5- 3.0  $\mu\text{m}$ .

On living leaves of *Polygonum aquaticum* L. (Polygonaceae); leg. H.S.G. Rao; March, 1991; Kushmhi Forest, Gorakhpur (U.P.); GPU Herb. No. HK 28/2628 isotype, HCIO 41129 holotype.

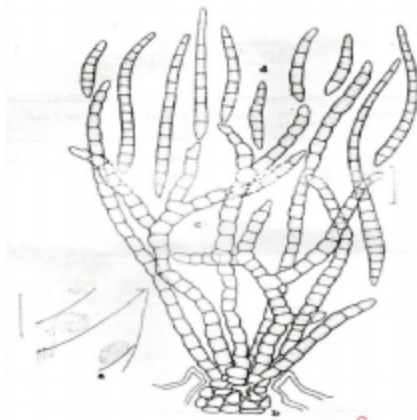


Fig. 1. *Pseudocercospora aquatica* Rao  
a- leaf spots, b- stroma, C- conidiophore,  
b- conidia. Scales : a- 20 mm; b, c, d, 20  $\mu\text{m}$

A perusal of literature shows that none of the *Pseudocercospora* species described so far have been recorded on the host species in question. However, four species of *Pseudocercospora* have been described earlier on several different species of the host genus, viz., *Ps. polygonorum* (Cooke) Guo & Liu (1991) *Ps.*

Table 01

Comparison of distinct morphotaxonomic features of *Ps. aricularis*

(Winter) Khan & Shamsi, *Ps. persicariae* (Yamam.) Deighton,

*Ps. polygonorum* (Cooks) Guo & Liu and *Ps. aquatica* Rao

Species	Leaf spots	Stomata	Conidio-Phores	Conidia
<i>Ps. aricularis</i> (Winter) Khan & Shamsi	Circular to irregular	Present, small	Fasciculate, rarely geniculate, sparingly branched, septate, 10-65 x 3-4 $\mu\text{m}$	30-75 x 3-5 $\mu\text{m}$
<i>Ps. persicariae</i> (Yamam.) Deighton	None or indistinct	Lacking	Non-fasciculate, branched, multi-septate, 35x150x 3.5-5.0 $\mu\text{m}$	20-100 x 3.5-5.0 $\mu\text{m}$
<i>Ps. polygonorum</i> (Cooke) Guo & Liu	None or indefinite	Mostly locking	Non-fasciculate to densely fasciculate, sparingly geniculate, branched, multi-septate 15-80 x 5-10 $\mu\text{m}$	15-30 x 5-10 $\mu\text{m}$
<i>Ps. aquatica</i> sp. nov	Circular to sub-circular	Present small 4-50 $\mu\text{m}$ in diam.	Non fasciculate or fasciculate, geniculate unbranched, 2-3 septate, 51.0-72.0 x 2.0-4.5 $\mu\text{m}$	18.0-73.50 x 1.5-3.0 $\mu\text{m}$

*avicularis* (H.G.Winter) Khan & Shamsi (1983), *Ps. persicariae* (Yamam.) Deighton (1976) *Ps. polygonicola* (Kar & Mandal) Deighton (1987). Out of these, earlier described species only *Ps. aricularis*, *Ps. persicariae* and *Ps. polygonorum* are comparable with the fungus in question and this comparison have been presented in table 01. This comparison shows that our collection differs from the earlier described species in the morphology of leaf spots, presence and size of stomata, emergence, geniculation, branching, septation and measurements of conidiophores as well as the measurements of conidia. Therefore, our fungus has been described and illustrated herewith as a new species.

*Pseudocercospora helminthostachydis-zeylanicae* Rao (Fig. 2)

Maculae hypogaeae, saepe amphigenae, primo irregulares deinde coalescentes et irregulares extensae, pallide vel atro brunneae, saepe fusco brunneae; Coloniae hypophyllae saepe amphiphyllae, effusae; Mycelium internum vel externum; Hyphae, ramosae, laevis, tenui tunicatae, subhyalinae; Stromata eumorpha, superficialia, saepe immersa, compacta, pseudoparenchymatosa, pallide vel atro brunnea, 36  $\mu\text{m}$  in diam.; Conidiophora in fasciculo stomatibus oriunda, macronematosa, mononematosa, non ramosa, 2-6 transverse septata, laevia, tenui tunicata, non geniculata saepe geniculata, erecta vel prostrata, recta vel flexuosa, obclavato-cylindrica, apicem versus rotundata, pallide



vel atro olivacea, 48.0-118.0 x 3.25- 7.0 µm; Cellulae conidiogenae integratae, terminales, polyblasticae, sympodiales, saepe denticulatae, cicatrices conidiales non incrassatae; Conidia solitaria, sicca, holoblastica, acropleurogena, non ramosa, cylindrica vel obclavatocylindrica, 4- 13 transverse septata, recta vel flexuosa, laevia, subhyalina vel pallide olivacea, apicem versus acuta vel obtusa, basi obconicotruncata, hilo non incrassata, 37.0-104.0 x 4.0-6.5 µm.

In foliis vivis *Helminthostachydis zeylanicae* Hook.

(*Ophioglossaceae*); leg. H.S.G. Rao; February, 1991; Nichlaul Forest, Maharajganj (U.P.); GPU Herb. No. HK 89/2689 isotypus, HCIO 41170 holotypus.

Leaf spots hypogenous, sometimes amphigenous, primarily irregular, later coalescing and spreading irregularly, light to dark brown, sometimes blackish brown; Colonies hypophyllous sometimes amphiphylous, effuse; Mycelium of hyphae internal and superficial, branched, smooth and thin walled, sub-hyaline; Stromata well developed, superficial, immersed, compact, pseudoparenchymatous, light to dark brown, 36 µm in diam.; Conidiophores arising in fascicles from stromata and superficial hyphae, macronematous, mononematous, unbranched, 2-6 transversely septate, thin and smooth walled, not geniculate sometimes geniculate, erect and prostrate, straight or flexuous, obclavatocylindrical, tip rounded, pale to dark olivaceous, 48.0-118.0 x 3.25-7.0 µm; Conidiogenous cells integrated, terminal, polyblastic, sympodial, sometimes denticulate, scars-unthickened; Conidia solitary, dry, holoblastic, acropleurogenous, unbranched, cylindrical to obclavatocylindrical, 4- 13 transversely septate, straight to flexuous, smooth, sub-hyaline to light olivaceous, apex acute to obtuse, base conicotruncate to obconicotruncate, hilum unthickened, 37.0-104.0 x 4.0-6.5 µm.

On living leaves of *Helminthostachys zeylanica* Hook. (*Ophioglossaceae*); leg. H.S.G. Rao; February, 1991; Nichlaul Forest, Maharajganj (U.P.); GPU Herb. No. HK 89/2689 isotype, HCIO 41170 holotype.

Fig. 2. *Pseudocercospora helminthostachydis- zeylanicae* Rao

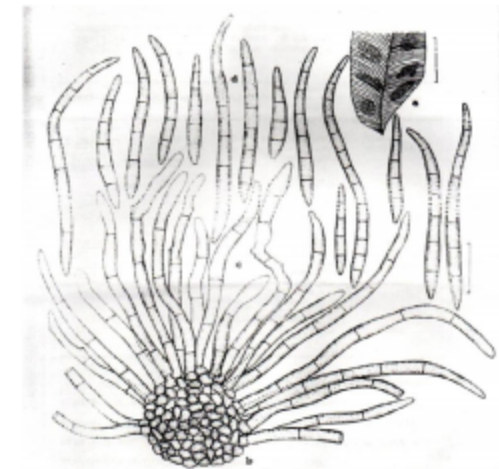
a- leaf spots, b- stroma, c-conidiophores, b- conidia. scales : a- 20 mm, b,c,d: 20 µm

Table-2

Comparison of distinct morphotaxonomic features of *Ps. Helminthostachydis*

(*P. Henn.*) *Deighton* and *Ps. helminthostachydis- zeylanicae* Rao

Species	Leaf spots	Stromata	Conidiophores	Conidia
<i>Ps. helminthostachydis</i> (P. Henn.)	Irregular to indistinct	30- 75 µm in diam	Sparingly Septate, not geniculate. erect, 10-65 x 3-5 µm	Almost straight
<i>Ps. helminthostachydis zeylanicae</i> Rao	Irregular later coalescing and spreading	Upto 36 µm in diam	26 transversely septate, sometimes geniculate, erect and prostrate, 48- 118 x 3.5-7.0 µm	Straight to flexuous



Earlier, *Ps. helminthostachydis* (*P. Henn.*) *Deighton* (1976) has been recorded on the host species in question. A comparison of morphotaxonomic features of our collection with the earlier described species shows that the both are differs from *Ps. helminthostachydis* in having different morphology of leaf spots, smaller stromata, more septate, sometimes geniculate as well as prostrate and longer conidiophores in addition to sometimes flexuous conidia. Therefore, our collection has been described and illustrated herewith as a new species.

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