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## Studies on "Cercospora—Like Fungi" from West Bengal

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**K. K. SARBAJNA AND B. K. CHATTOPADHAYAY**

*Department of Botany, Presidency College, Calcutta-700 073*

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The present paper deals with two new species of *Cercospora*, *Cercospora cyclosori* and *Cercospora laporticola* have been collected on *Cyclosorus* sp. and *Laportea crenulata* respectively from West Bengal, are described and illustrated as new science on the basis of host specificity and comparative morphological studies.

Key words : Taxonomy, *Cercospora*.

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This paper deals with the taxonomical study of two leaf inhabiting 'Cercospora-like fungi' with thickened conidial scars on the conidiogenous cells. Deighton (1973, 1974, 1976, 1979 & 1983) laid much stress on scars (e.g. thickened or unthickened) on the conidiophore of the *Cercospora*-like fungi. In their "Fungi of India", Bilgrami *et. al* (1979, 1981) and recently Rathaiah (1981) and Saikia and Sarbhoy (1982) have recorded about six hundred species of this group. The present paper deals with two leaf inhabiting "Cercospora-like fungi" of which *Cercospora cyclosori* and *Cercospora laporticola* have been described and illustrated as new. Chupp's monograph on the fungus genus *Cercospora*, 1953, has been particularly useful, as it gives detailed description of various species. The type specimen have been deposited in the Herbarium, C.A.B. International Mycological Institute, Kew, Surrey, U.K., as indicated by IMI number.

The specimens were collected from different localities of West Bengal under varied climatic conditions during different season of 1983-1987. The infected leaves having distinct symptoms were carried to laboratory in separate polythene bags. These were spread out in between two blotting papers and dried following standard technique. The fully dried specimens were packed with paradichloro-benzene

in a separate paper envelope. A portion of the infected host tissue was detached carefully with a sharp-blade. It was then mounted on a glass slide in a drop of lactophenol (0.1 per cent cotton blue solution was also used) and covered with a cover glass and heated on a spirit lamp flame so as to make the tissue transparent. The prepared slides were sealed with paraffin wax. Free hand sections of the host leaf through the infected regions were also made to study the details of mycelial structures and stromata. The slides were carefully examined under different magnification of compound microscope. The measurements of different structures were also taken at the same time and camera-lucida drawings were prepared. A part of each specimens were sent to C.A.B. International Mycological Institute, for accession and confirmation of the identity of fungi associated. The taxonomic determination were made with the help of relevant literature.

*Cercospora cyclosori* K. K. Sarbajna and B. K. Chattopadhyay sp. nov. (Fig. 1).

Etym.—From the name of the host genus.

Maculae amphigenae, distinctae, angulares vel irregulares, saepe maculae aggregati, venas limitatae, numerosae, centro albido, plerumque areae pallide-brunneae cinctae, 0.5—2 mm latae; caespituli amphigeni, inaequaliter disseminati, brunneae; stroma non bene evolutum; conidiophora amphigeni, solitaria vel fasciculata, 2-12 in fasciculo divergenti per stoma emergentia, recta vel flexa, pallide-brunneae vel modice-brunneae, simplicia, laevia, pluriseptata usque 8, 1-5 geniculata, distincta cicatrices conidiales 2.5-3.5  $\mu\text{m}$  diam., apice subtruncata, 3.0-5  $\times$  99-165  $\mu\text{m}$ ; conidia obclavata, subhyalina vel pallide-olivacea, recta vel curvata, laevia, pluriseptata usque 20, apice sub-acuta, 2.5  $\times$  50—132  $\mu\text{m}$ , basi obconico vel truncatum, hilum incrassatum.

Habitat in foliis vivis: *Cyclosorus* sp. (Thelypteridaceae), Mankundu, Hooghly, Bengal occidentales, India, No PCC 4964 (IMI 311128), leg. K.K. Sarbajna, 28 August, 1986.

Leaf spot amphigenous, angular to irregular, often coalescent, vein limited, spots whitish centre surrounded by light brown areas, virulent, 0.5—2 mm in extent; caespituli amphigenous, unevenly distributed over the spots, brownish; stroma poorly developed; conidiophores amphigenous, solitary to fasciculate, in fascicle of 2-12 divergent stalks emerging through the stomata, straight to bent, pale to mid brown, simple, thick-walled, smooth pluriseptate (3-8 septa), geniculate (1-5), spore scar (2-7 in number), 2.5-3.5  $\mu\text{m}$  in diam., distinct, situated on the tip or at the point of geniculation, tip subtruncate, 3-5  $\times$  99-165  $\mu\text{m}$ ; conidia obclavate, subhyaline to pale olivaceous, straight to curved, smooth and thin walled, pluriseptate (3-20 septa), septa indistinct to distinct apex sub-acute, 3-4.5  $\times$  50-132  $\mu\text{m}$ , base obconic to truncate with thickened hilum.

Specimen studied: On *Cyclosorus* sp. (Thelypteridaceae), Mankundu, Hooghly, West Bengal, India. No. PCC 4264 (IMI 311128), leg. K. K. Sarbajna, 28 August, 1986.

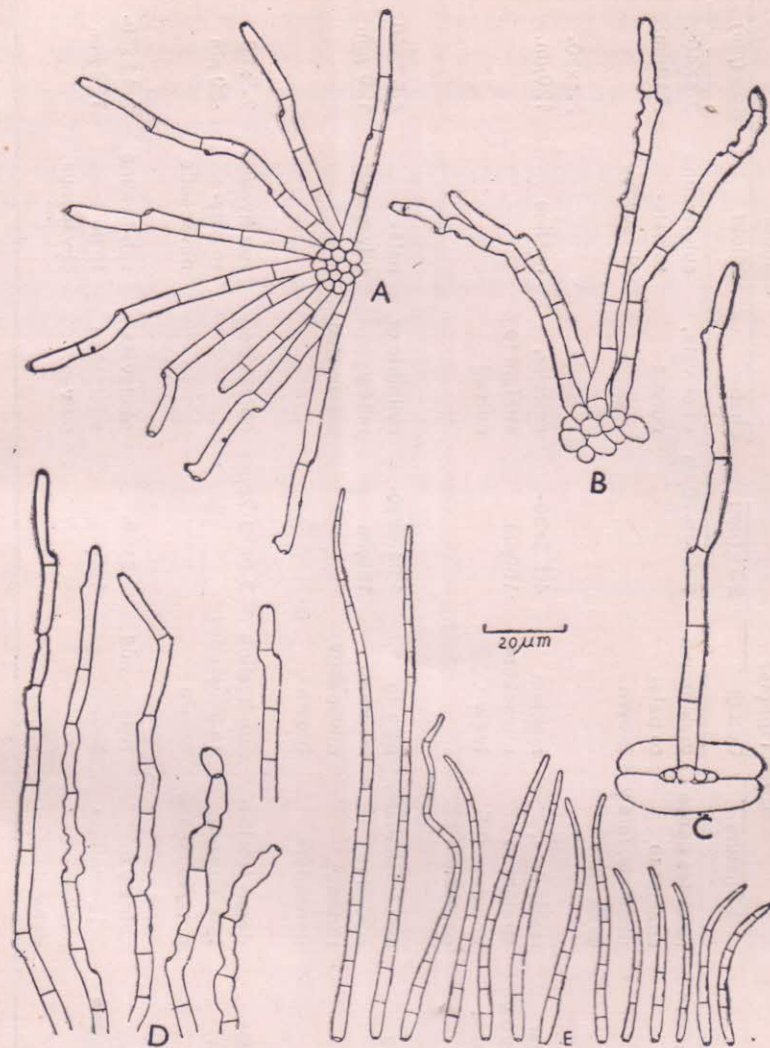


Fig. 1. *Cercospora cyclosori*; A&B, Conidiophore fascicles; C, A solitary conidiophore emerging through stomata; D, Conidiophores; E, Conidia.

Since the establishment of the genus *Cercospora* Fresenius, none of its species has yet been reported on the present host *Cyclosorus* sp. (*Thelypteridaceae*). It is also reported that there is no records or specimens of any *Cercospora* spp. on this host at the Herb. IMI. However four species of the genus *Cercospora* have already been described on different under the family Polypodiaceae. These are *C. pteridis* Siemaszko, *C. aspenii* Jaap, *C. adianti* Sydow, and *C. phyllitidis* Hume, on *Pteridium aquilinum*, *Asplenium irichomanes*, *Adiantum tetraphyllum* and *Polypodium phyllitidis* respectively (Chupp 1953). Although some of the species

Table 1. Showing comparison between *Cercospora* spp. with new species

Name of the species	Conidiophores				Conidia			
	Leaf spot	Stroma	Structure	Colour	Size ( $\mu\text{m}$ )	Shape	Colour	Size ( $\mu\text{m}$ )
<i>C. pterides</i> Siemaszko	sub-circular, yellowish brown to grey	dark brown	fascicles dense straight to undulate, rare y geniculate.	dark brown to pale- brown	3-5x35-80 $\mu\text{m}$	obclavate, curved	sub-hyaline to pale- olivaceous	2-4x40 -210 $\mu\text{m}$ .
<i>C. asplenii</i> Jaap	minute to large, brown.	globular dark-brown to almost black	fasciculate, straight to undulate, 0-5 geniculate	medium olivaceous brown,	4-5.5x30- 150 $\mu\text{m}$ .	acicular, straight to curved	hyaline	2-4x20- 120 $\mu\text{m}$ .
<i>C. adianti.</i> Sydow	none or indistinct	lacking	non-fasciculate, curved to tortuous, geniculate,	pale to medium- olivaceous brown	4.04-6x30- 150 $\mu\text{m}$ .	cylindric or mildly attenuated	pale- olivaceous	4-5.5x50- 120 $\mu\text{m}$ .
<i>C. phyllitidis</i> Hume	mostly irregular, brown	globular, brown	dense fascicu- late, straight, not geniculate,	sub-hyaline to olivaceous brown	3-5x10-75 $\mu\text{m}$	obclavate,	sub-hyaline to pale- olivaceous	2-3x80 -80 $\mu\text{m}$
<i>C. cyclosari</i> sp. nov.	angular to irregular, vein limited, whitish centre.	poorly developed	solitary or 2-12 conidio- phores, 1-5 geniculate	pale to mid brown	3-5x99- 165 $\mu\text{m}$ .	obclavate, straight to curved	sub-hyaline to pale- olivaceous	3-4.5x50- 132 $\mu\text{m}$ .

of *Cercospora* are quite distinct, there is a lot of overlapping of characters in others. The present fungus is distinct with all the four *Cercospora* spp. The salient characters differentiating all the recorded species as outlined by Chupp 1953, have been tabulated to justify new species.

In view of the above differences the present fungus could not be accommodated in any species of this group known and therefore, it has been described and illustrated here under a new specific epithet, viz., *Cercospora cyclosori* sp. nov.

*Cercospora laporticola* K. K. Sarbajna & B. K. Chattopadhyay

Etym —From the name of host Genus.

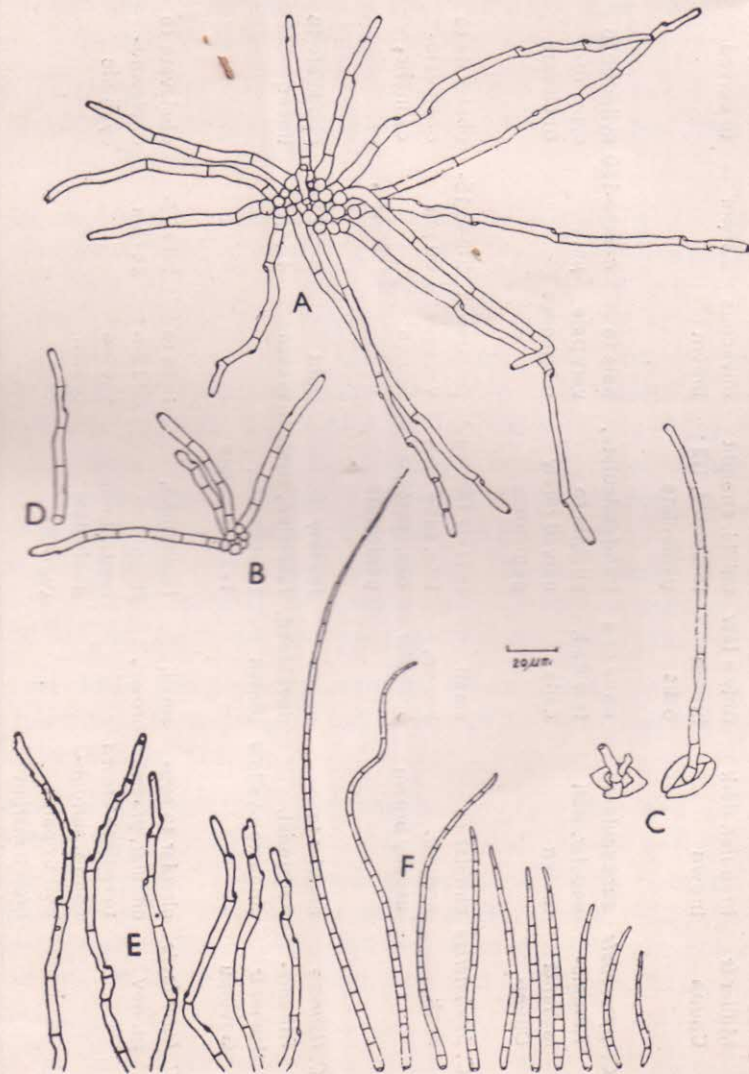


Fig. 2. *Cercospora laporticola*; A, B&C, Conidiophore fascicles; D, A solitary conidiophore; E, Conidiophores; F, Conidia.

Table 2. Showing comparison on between *Cercospora* spp. with new species

Name of the species	Conidiophores				Conidia			
	Leaf spot	Stroma	Structure	Colour	Size ( $\mu\text{m}$ )	Shape	Colour	Size ( $\mu\text{m}$ )
<i>C. Krugiana</i> Muller & Chupp	angular to irregular, dark brown	lacking or only a few brown cells	loosely fasci- culate, straight to curved, 1-2 geniculate	medium olivaceous brown	4.5-6x30- 230 $\mu\text{m}$	acicular, straight to curved	hyaline	2.5-4x40- 120 $\mu\text{m}$
<i>C. mysorensis</i> Thiruma- lachar & Chupp	subcircular to angular, dull brown	none or a few dark cells	non-fasciculate, straight to curved rarely geniculate	pale to very pale fuliginous	4-6x20-150 $\mu\text{m}$	cylindric to cylindro- obclavate	sub-hyaline to pale fuligeous	4-6x20-80 $\mu\text{m}$
<i>C. boehmeriae</i> Peck	circular to angular, usually brown	small brown, globular	loosely fascicu- late, sub-flexu- ous, rarely geniculate	pale-oli- vaceous brown	2-5-4x15- 60 $\mu\text{m}$	obclavate to obclavato- cylindric,	sub-hyaline to pale olivaceous brown	2.5-4x40- 125 $\mu\text{m}$
<i>C. fleuryae</i> Thiruma- lachar & Govindu	angular to polygonal, cinnamon-yellow	poorly developed, brown	loosely fasciated, straight to undulate, 1-3 geniculate	light brown	3-4x21.4- 42.4 $\mu\text{m}$	obclavate to linear,	hyaline	3x50- 165 $\mu\text{m}$
<i>C. laporticola</i> sp. nov	circular to sub- circular, greyish to reddish brown centre, surround- ed by pale brown margin	small, brown,	fasciculate, straight to bent, highly geniculate (upto 9)	light to mid oli- vaceous brown	3-6x33- 247 $\mu\text{m}$	obclavate to obclavato- cylindric	light to pale olivaceous brown	3-4.5x50- 264 $\mu\text{m}$

Maculae amphigenae, circulares vel subcirculares, centrogriseo-brunneae vel rubido-brunneae, plerumque margin pallide-brunneae cinctae, distinctae, numerosae, 2-4 mm latae; caespituli amphigeni sed plerumque hypophylli, brunneae vel nigrae, aequaliter disseminati; stroma parvum, brunneae; conidiophora amphigeni, plerumque fasciculata, interdum solitaria, 2-21 in fasciculo divergentia per stoma emergentia, pallide vel modice-olivacea brunneae, apicem versus pallidiora, recta vel flexa, simplicia, laevia, pluriseptata usque 9, geniculata usque 9, cicatrices conidiales circa 3-3.5  $\mu\text{m}$  diam., tip subobtusa vel rotundata, 3.6.5  $\times$  33-247  $\mu\text{m}$ ; conidia obclavata vel obclavato-cylindrica, pallide olivacea brunneae, recta vel flexa, laevia, pluriseptata usque 33, apice subacuta, saepe subobtusa, 3-4.5  $\times$  50-214  $\mu\text{m}$ ., basi subtruncatum vel leniter obconico hilum increassatum.

Habitat in foliis vivis *Laportea crenulata* Geudi (fam. Urticaceae), Baradighi forest, Jalpaiguri, Bengal occidentalis, India, No. PCC 3462 (IMI 284562), leg. K.K. Sarbajna, 22 October, 1983.

Leaf spot amphigenous, older leaves more affected, circular to subcircular, greyish to reddish brown centre usually surrounded by pale brown margin, sometimes leaving shot-hole, distinct, numerous, uniformly distributed over the lamina, 2-4 mm in diam; caespituli amphigenous, chiefly hypophyllous, brown to black, evenly distributed over the spots; stroma small, brown; conidiophores amphigenous, mostly fasciculate, sometimes solitary, in fascicle of 2-21 divergent stalks emerging through the stomata, light to mid olivaceous brown, slightly paler towards the apex, straight to bent, simple, smooth, thick-walled, pluriseptate (3-9 septa), highly geniculate upto 9, presence of both terminal and lateral scars, 3-3.5  $\mu\text{m}$  in diam., tip subobtuse to rounded, 3-6.5  $\times$  33-247  $\mu\text{m}$ ; conidia obclavate to obclavate-cylindric, light to pale olivaceous brown, straight to bent, smooth, thin walled, distinctly pluriseptate (septa upto 33), apex subacute often subobtuse, 3-4.5  $\times$  50-264  $\mu\text{m}$ ., base subtruncate to slightly obconic with thickened hilum.

Specimen studied: On *Laportea crenulata* Geudi (fam. Urticaceae), Baradighi forest, Jalpaiguri, West Bengal, India, No. PCC 3462 (IMI 284562), leg. K.K. Sarbajna, 22 October, 1983.

Four species of the genus *Cercospora* have already been described on the different host under the family Urticaceae. The reported species are *C. krugiana*, *C. mysorensis*, *C. bochmeriae*, *C. fleuryae* on *Bochmeria nivea*, *Pouzolzia bennettiana*, *Boehmeria nivea* and *Fleurva interrupta* respectively (Chupp, 1953; Vasudeva, 1963). The salient characters differentiating all the recorded species as outlined by Chupp (1953), and Vasudeva (1963) have been tabulated to justify new taxon.

In all four species of *Cercospora* have been described, the following comparative chart of the known species has been tabulated to justify the new species. In view of the above differences, the present fungus has been described and illustrated as new i.e. *Cercospora laporticola* sp. nov.

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