

Two new species of *Cladosporium* Link Ex Fr. from Sagar, (M.P.) India.

Dr. SANDHYA PARIHAR (G.F.)

Department of Botany, Govt. Holkar Science College, Indore (M.P.)

ABSTRACT : Two new species of *Cladosporium* collected from Botanical Garden, University and Pankaj Nursery of Sagar, M.P. (India) causing leaf spots on dry leaves of *Centella asiatica* (L.) Urban. (Apiaceae) and *Cinnamomum tamala* Nees & Eberm. (Lauraceae) is described and illustrated. Type specimens has been deposited in H.C.I.O., New Delhi and the accession number is allotted. Morphotaxonomic treatment of isotype has been done by comparing with allied taxa in question and consulting the current literature.

Key words: *Cladosporium*, Follicolous fungi, Hyphomycetes, Morphotaxonomy.

INTRODUCTION

On systematic and periodic survey of Sagar, M.P. (India) on 2004-05. A number of collections of dry leaves exhibiting leaf spots and blights were encountered. Of these, upon critical examination and comparison of morphotaxonomic features with those of the allied forms two taxa of species rank have found to be hitherto undescribed. This is described and illustrated as *Cladosporium centellae* sp. nov. and *Cladosporium cinnamomae* sp. nov. Parihar sp. nov. parasitizing in the dry leaves of *Centella asiatica* (L.) Urban. (Apiaceae) and *Cinnamomum tamala* Nees & Eberm. (Lauraceae). Illustrations have been executed with camera - lucida and latin diagnoses.

MATERIALS AND METHODS

The specimens were collected from Botanic Garden of Dr. H.S. Gour University and Pankaj Nursery of Sagar, M.P. in India. The collected specimens were sprayed with aqueous HgCl₂ 0.1% solution to check the microbial decomposition and stored in airtight polythylene bags along with naphthalene balls. Microscopic slides were prepared by using lactophenol cotton blue mixture. The slides were studied under the compound microscope in different combination of eye pieces (10x, 12.5x, 15x) and objectives (10x, 40x, 45x and oil immersion). The desired camera lucida drawings of the interesting forms were made showing maximum diagnostic features available in the morphology and ontogeny of reproductive propagules and their measurements. The observation including symptomatology was then consolidated. The observations taken for each specimen were then compared with the forms already described about the particular fungus on the particular host species, host genus or host family, from India. The specimens constituting new records at least for this country and forms new to science were retained with care. Thus, the final sorting of specimens was done at this stage. Afterwards a thoroughly scrutinized and revised final host.

RESULTS AND DISCUSSIONS

Taxonomic Description

Cladosporium centellae Parihar sp. nov. (Fig. 1)

Maculae amphigenosae, parvae vel magnae, dispersae per totam superficiem folii, atro. Coloniae epiphyllosae, effusae, emmasa crassa pulverulenta, atro. Mycelium hypharum superficiale vel immersum, angustum, laevia, ramosum, septata, olivacea brunnea. Stromata bene evoluta, superficiale vel immersum, pseudoparenchymatosa, medio olivacea vel brunnea. Conidiophora plerumque caespitosa, interdum solitaria, macronematosa et micronematosa, mononematosa, usque 10 transversae septata, erecta, recta vel flexuosa, interdum geniculata, medio olivacea 6.5-396x3-9 μ m. Cellulae conidiogenosae, incorporatae, terminales et intercalares, polyblastae, sympodiales, cicatricatae, cicatricis fusco distinctae et crassata. Conidia, simplicia, catenata (in catenin ramosis) vel solitaria, sicca, acropleurogenosa, cylindrata vel obclavatocylindrata, diversus forma, doliiformia, ellipsiformia, globosa vel subglobosa, apices obtusa, basim roundata, obconicotruncata vel subtruncata, usque 4 transversae septata, hilo fusco et crassata, pallide vel medio olivacea, 6.5-35x3-10 μ m. Fig.-1.

In foliis vivis *Centella asiatica* (L.) Urban. (Apiaceae), Oct. 2004, Botanical Garden, University Sagar, M.P. India, leg. S.Parihar, S.U. Herb No. SRR-220 holotypus HClO No. 46,491.

Lesions amphigenous, small to large, distributed all over the leaf surfaces, black. Colonies epiphyllous, effuse, thick powdery mass, black. Mycelium of hyphae superficial, narrow, smooth, branched, septate, olivaceous brown. Stromata well developed, superficial, pseudoparenchymatous, mid olivaceous to brown. Conidiophores mostly caespitose, sometimes solitary, macronematous and micronematous, mononematous, upto 10 transversely septate, erect, straight to flexuous, sometimes geniculate, mid olivaceous 6.5-396x3-9 μ m. Conidiogenous cells integrated, terminal and intercalary, polyblastic, sympodial, cicatrized, scars dark, distinct and thickened. Conidia simple, catenate (in branched chain) to solitary, dry, acropleurogenous, cylindrical to obclavatocylindric, variously shaped, muriform, doliiform, ellipsoidal, spherical or sub spherical, apices obtuse, bases rounded, obconicotruncate to subtruncate, upto 4 transversely septate, hill dark and thickened, light to mid olivaceous, 6.5-35x3-10 μ m. Fig.-1.

On living leaves of *Centella asiatica* (L.) Urban. (Apiaceae), Oct. 2004, Botanical Garden, University Sagar, M.P. India, leg. S.Parihar, SRR-220 holotype HClO No. 46,491. A literature survey on *Cladosporium* species shows *C.acaciola* Ellis (Ellis,1976) & *C.colocasiae* Sawada (Ellis,1971) for comparison with the present fungus (Table-1). The tabular data clearly reveal that the author's fungal specimen is altogether distinct in its symptomatology, well developed stromata,

caespitose and excessively long conidiophores and wider conidia. Therefore, the proposed taxon in no way be accommodated with preexisting species and demands its rank as new species of *Cladosporium*.

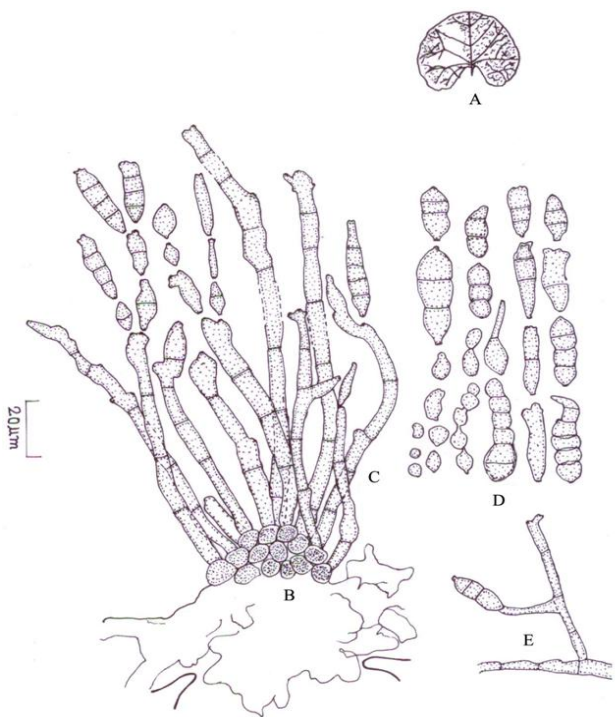


Fig. 1 – *Cladosporium centellae* Parihar sp. nov.

A: Symptom, B: Stroma, C: Conidiophores, D: Conidia, E: Repent Hyphae

Table :1 Comparative account of *Cladosporium centellae* sp. nov. with *C. acaciicola* & *C. colocasiae*

<i>Cladosporium</i> spp.	Spots & Colonies	Stroma	Conidiophores	Conidia
<i>Cladosporium acaciicola</i> (Ellis, 1976)	Colonies on m.a. effuse, isabelline to oliv., velvety or fluffy. Chlamydo spores often formed	-	Smooth, mid pale oliv. brown, 60×3-6	Ramo-conidia and conidia in long, branched chains, elliposidal or cylindrical, smooth or rarely minutely roughened, often constricted at the septa which are usually dark, oliv. brown, 0-3 (most commonly 2) septa, 5-25× 3-8
<i>C. colocasiae</i> Sawada (Ellis, 1971)	Colonies amphigenous, effuse, greyish	-	Macronematous, erect, straight or flexuous, nodose,	Conidia arising from terminal swellings, which later become intercalary, in simple or branched

	olive, velvety		smooth, terminal and intercalary vesicular swellings 8-10 μ diam., pale to mid brown, 180 \times 4-6	chains, cylindrical or oblong rounded at the ends, or ellipsoidal, often constricted in the middle or between septa, smooth, pale to mid brown, 1-3 (occasionally 5) septa, 12-32 \times 6-9 (mostly 15-20 \times 6-8)
<i>C. centellae</i> sp. nov.	Colonies amphiphylous, predominantly epiphyllous, shown by very fine distinct black dots	Well developed, superficial, pseudoparenchymatous, mid oliv. to brown	Mostly caespitose, sometimes solitary, macronematous, mononematous, and micronematous septate, erect, straight to flexuous, sometimes geniculate, terminal and intercalary, mid oliv., upto 10 trans.septa, 6.5-396 \times 3-9	Conidia simple, catenate (in branched chain) to solitary, cylindrical to obclavotocylindric, variously shaped, muriform, doliiform, ellipsoidal, spherical or subspherical, apices obtuse, bases rounded, obconicotruncate to subtruncate, hila dark and thickened, light oliv. to mid oliv. 0-4 septa, 6.5-35 \times 3-10

***Cladosporium cinnamomae* Parihar sp. nov. (Fig. 2)**

Maculae amphigenosae, minutus, enormis, irregularia, expando in holo folii superficiem, atrae. Coloniae hypophyllosae, effusae, paene occupantes totam superficiem folii, atrae. Mycelium hypharum immersum vel superficiale, angustum, laevia,, ramosum, septata. Stromata bene evoluta, immersum vel superficiale, irregulares, pseudoparenchymatosa, fusco olivacea 60 μ m. in diametro. Conidiophora plerumque caespitosa, raro solitaria, macronematosa, mononematosa, usque 6 transversae septata, laevia, eramosa, erecta vel suberecta, recta vel flexuosa, geniculata, medio olivacea, 3-158 \times 3-6 μ m. Cellulae conidiogenae incorporatae, terminales et intercalares, polyblasticae, sympodiales, cicatricatae, cicatricis fuscus distinct et crassato. Conidia simplicia, cylindrica, doliiformia, ellipsiformia, ovata, globosa, muriformia, apicem obtuse, basim roundata vel obconicotruncata, laevia, usque 4 transversae septata, hilo fusco, distincto et crassata, pallide vel medio olivacea , 3-26 \times 3-7 μ m. Fig.-2.

In foliis sicca *Cinnamomum tamala* Nees & Eberm. (Lauraceae), Feb. 2005, Pankaj Nursery, Sagar M.P. India, leg. S.Parihar SRR-248 holotypus HClO No. 46,499.

Lesions amphigenous, minute, enormous, irregular, spread over on the whole leaf surface, black. Colonies hypophyllous, effuse, covering almost the entire leaf surface, black. Mycelium of hyphae immersed to superficial, narrow, smooth, branched, septate. Stromata well developed, immersed to superficial, irregular, pseudoparenchymatous, dark olivaceous, 60µm. in diam. Conidiophores mostly caespitose, rarely solitary, macronematous, mononematous, upto 6 transversely septate, smooth, unbranched, erect to suberect, straight to flexuous, geniculate, mid olivaceous , 3-158x3-6µm. Conidiogenous cells , integrated, terminal and intercalary, polyblastic, sympodial, cicatrized scars dark, distinct and thickened. Conidia simple, catenate to solitary, cylindrical, doliiform, ellipsoidal, fusiform, ovoid, spherical, muriform, apices obtuse, bases rounded to obconicotruncate, smooth, upto 4 transversely septate, hila dark, distinct and thickened, light to mid olivaceous, 3-26x3-7µm. Fig.-2.



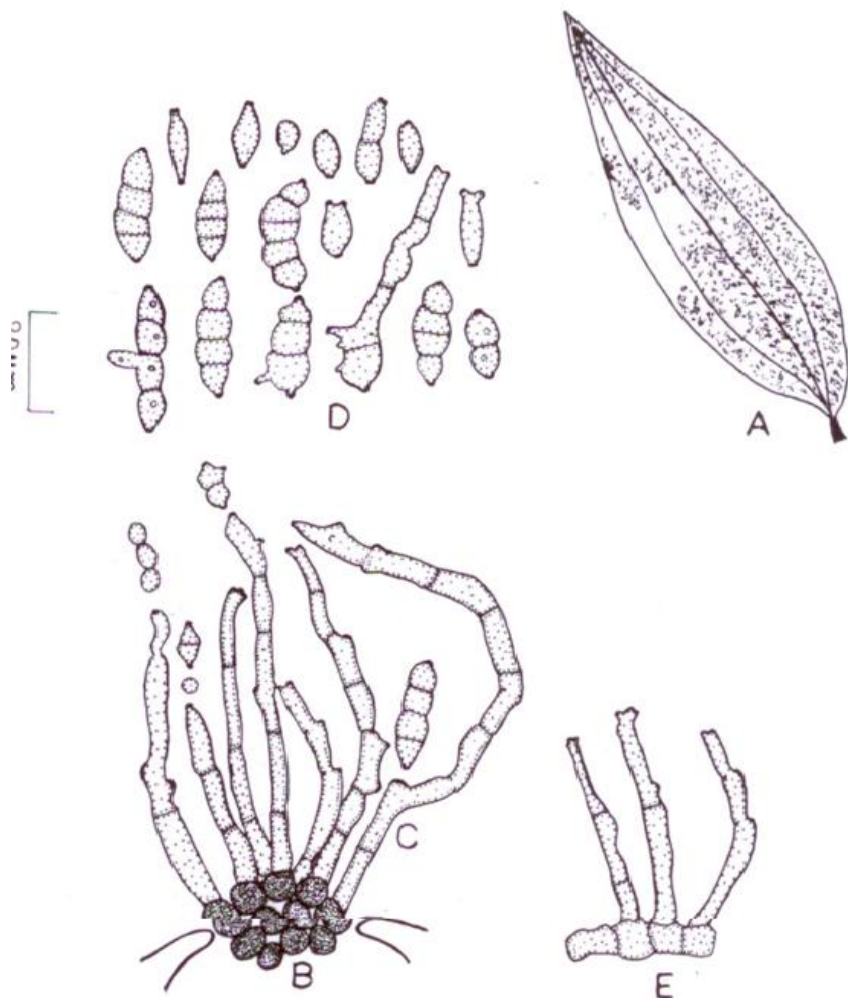


Fig. 2- *Cladosporium cinnamomae* Parihar sp.nov.

A: Symptom, B: Stroma, C: Conidiophores, D:Conidia, E:Repent Hyphae

Table : 2 Comparative account of *Cladosporium cinnamomae* sp. nov. with *C.apicale* & *C.colocasiae*

<i>Cladosporium</i> spp.	Spots & Colonies	Stroma	Conidiophores	Conidia
<i>Cladosporium apicale</i> Berk, & Br. (Ellis, 1976)	Colonies hypophyllous, grey to black, hairy, stretching	Present	Solitary or more often in fascicles arising from a dark stroma, straight or flexuous, subulate, often branched	Subspherical, limoniform, ellipsoidal, fusiform or cylindrical, smooth, pale olive or oliv. brown 0-3

	halfway or right across the leaves		near the apex, thick walled, septate, smooth, scars small, numerous, Dark reddish brown, upper part paler, 250×8-16 µm thick at the base, 2-4µm	septate, 3-20×2.5-6
<i>C. colocasiae</i> Sawada 1916 (Ellis, 1971)	Colonies amphigenous, effuse, greyish olive, velvety	-	Macronematous, erect, straight or flexuous, nodose, smooth, terminal and intercalary vesicular swellings 8-10 µ diam. Pale to mid brown, 180×4-6	Arising from terminal swellings, which later become intercalary, in simple or branched chains, cylindrical or oblong rounded at ends or ellipsoidal, often constricted in the middle or between septa, smooth, scar at each end markedly protuberant, Pale to mid brown, 1-3 (occasionally 5), 12-32 ×6-9 (mostly 15-20 ×6-8)
<i>C. cinnamomae</i> sp.nov.	Colonies hypophyllous, effuse, covering, almost entire leaf surface, black	Well developed, immersed to superficial, dark oliv.	Mostly caespitose, rarely solitary, macronematous, septate smooth, unbranched, erect to suberect, straight to flexuous, geniculate, mid oliv., upto 6 trans. septa, 3-158×3-6	Conidia simple, catenate to solitary, cylindrical, doliiform, ellipsoidal, fusiform, muriform, ovoid, spherical, apices obtuse, base rounded to obconicotruncate, smooth, Light to mid oliv., 0-4 trans. septa, 3-26×6.5

On dry leaves of *Cinnamomum tamala* Nees & Eberm. (Lauraceae), Feb.2005, Pankaj Nursery, Sagar, M.P. India, leg. S.Parihar SRR-248 holotype, HCIO No.46,499.

Cladosporium apicale Berk. & Br. (Ellis, 1976) & *C.colocasiae* Sawada (Ellis, 1971) are the two species found for comparison with the present species (Table-2). A critical look to the mycotaxonomic characters of table shows that *C.cinnamomae* more or less resembles *C.apicale* & *C.colocasiae* in conidial size but quite different in well developed stromata, much shorter conidiophores with mostly 0-4 septate conidia. The conidiophores of *C.apicale* are much broader than the two. It is also added that no *Cladosporium* species has ever been reported on the host family. Looking to the over all description it is describe as a new species.

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