

A NEW SPECIES OF *CATENULOSTROMA* ON *AZADIRACHTA INDICA* FROM PAKISTAN

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Abstract

A new species of *Catenulostroma azadirachta* on *Azadirachta indica* from Pakistan is described and compared with related species.

Introduction

Azadirachta indica (*Melia azadirachta*) belongs to family *Meliaceae*. Its local name is Neem. It is important due to its commercial and medicinal value. *Azadirachta indica* is also an important plant for its potential anti-fungal, anti-bacterial and insecticidal activities (Helmy *et al.*, 2007). Decline of trees due to fungi are increasing tremendously in Pakistan especially in Punjab and Sindh (Matsushima, 1993, Javed *et al.*, 2004; Fateh *et al.*, 2011; Farooq *et al.*, 2011).

Sixteen fungi has been reported on *Azadirachta indica* from Pakistan (Ahmad, 1956, 1962, 1969; Ahmad & Arshad, 1972; Ahmad *et al.*, 1997; Ghaffar & Kafi, 1968; Ghaffar *et al.*, 1971; Ghaffar & Abbas, 1972; Ghafoor & Khan, 1976; Khan, 1952, 1969, 1989; Khan & Kamal, 1968; Kamal & Mughal, 1968; Malik & Khan, 1944).

Recently Abbas *et al.*, (2012) have reported eleven (11) fungi from Faisalabd and Gojra including new species viz.: *Tiarosporella azadarichta* sp. nov., *Diplozythiella bambusina*, *Ulocladium chartarum*, *Cladosporium nigrellum*, *Cladosporium oxysporum*, *Didymostilbe coffeae*, *Muellerella pygmaea*, *Lasiodiplodia paraphysaria*, *Monochaetiniula terminalae*, *Trimmatostroma* sp., and *Epidermophyton floccosum* were reported for the first time on *Azadirachta indica* from Pakistan (Faisalabad and Gojra).

Critical studies of *Trimmato spara* sp., is the text of this paper and it is described as a new species *Catenulostroma azadirachta* on *Azadirachta indica*.

Materials and Methods

Sample of *Azadirachta indica* was collected from Gojra, Pakistan. Methods and materials was the same as described by Abbas *et al.*, (2010). Identification up to species level were carried out after consulting (Ellis, 1971, 1976; Carmichael *et al.*, 1980; Sutton & Ganapathi, 1978; Ahmad *et al.*, 1997; Kirk, 2012; Crous *et al.*, 2007).

Results and Discussion

Holotype Fungus found on *Azadirachta indica* specimen # G.C.U.F. Mycol. H. # 35 is described as *Catenulostroma azadaricta*. sp. nov.

Description of the fungus under study: Colonies dark brownish black on natural substrate. Stroma large, thick and brown. Conidiophore micromenatous slightly dissimilar with vegetative hyphae, unbranched, straight or wavy, pale brown and verrucose, 21-23×6-7µm. Conidiogenous cells terminal and cylindrical, 9-10×7µm. Conidia thick walled, highly variable in size and shape, 1-several transverse and oblique distosepta. Septa, brown, 45.6-182.4×7.6-15.2µm.

Holotype: *Catenulostroma azadirachta* on *Azadirachta indica*; Samanabad, Gojra Pakistan; 25 April, 07; G.C.U.F. Mycol. H. # 35; S.Q. Abbas & Nabila Iftikhar.

Latin description: Colonia atra brunnea et naturalis subtracta. Stromata longa, profundus ad brunnea. Conidiophora micromenatous differentis de hyphae.nonstipestis, erectais or cripenstae, pallens brunnae (21-23×6-7µm), Cellule conidiogenae terminalae ad cylindreae (10×7 µm.) Conidia profundus moenitis, variabetis et farmaad adamplitudis.1-multi transverse ad longibus distoseptatis, brunnea (45.6-182.4×7.6-15.2µm) Fig. 1.

Holotypus: *Catenulostroma azadirachta* et ramis emortuus; Samanabad Gojra Pakistan; 25 April, 07; G.C.U.F. Mycol.H. # 35; S.Q. Abbas & N. Iftakhar.

Genus *Trimmatostroma* was erected by Corda. It has 35 species (Kirk, 2012). This genus is characterized by having simple sporodochial conidiomata or acervulus, simple, little differentiated conidiophore, and conidiogenous cells and polymorphic conidia arranged in chain (Ellis, 1971, 1976).

Trimmatostroma lichenocola Christ & Hawksworth (Hawksworth, 1979) was a first lichicolous species arranged in this genus, later on Hawksworth & Cole (2002) separated this species with other hyphomycetes fungus and erected a new genus *Lichinocola* which can be separated by its lichicolous character, and immersed multicellular and totally submerged conidiophores, and pale smooth walled conidia with few septa in conidia.

Recently molecular studies revealed that *Trimmatostroma* is a heterogenous. (Crous *et al.*, 2007) and are of the opinion that *Trimmatostroma* be confined to *T. salicis* Corda.

Taeniolla is the genus which can be separated from *Trimmatostroma* by its superficial, semi macronomatous conidiophore, conidia arranged in acropetal manner, lacking multicellular stromatic aggregation of conidial cells. Since stromatic conidiomata absent (where as type species of *Trimmatostroma*: *T. salicis* has sporodochial conidiomata and basal stromata) therefore inclusion in *Trimmatostroma* is questionable. It is also important to note that conidiomata specially acervulus and sporodochia and conidiophore are not good generic characters, therefore they placed four lichicolous fungi in *Trimmatostroma* for time being viz., *T. dendrographae* Diedrech (Conidia 7-25x5.5-8.5 µm); *T. hierrenge* (Conidia 7.5-15x3.5); *T. lecanicola* Diedrech.(conidia 6.5-10 x6-8µm.); *T. quercicola* Diedrech, Braun & Hendcher (conidia 6-30x5-15µm).

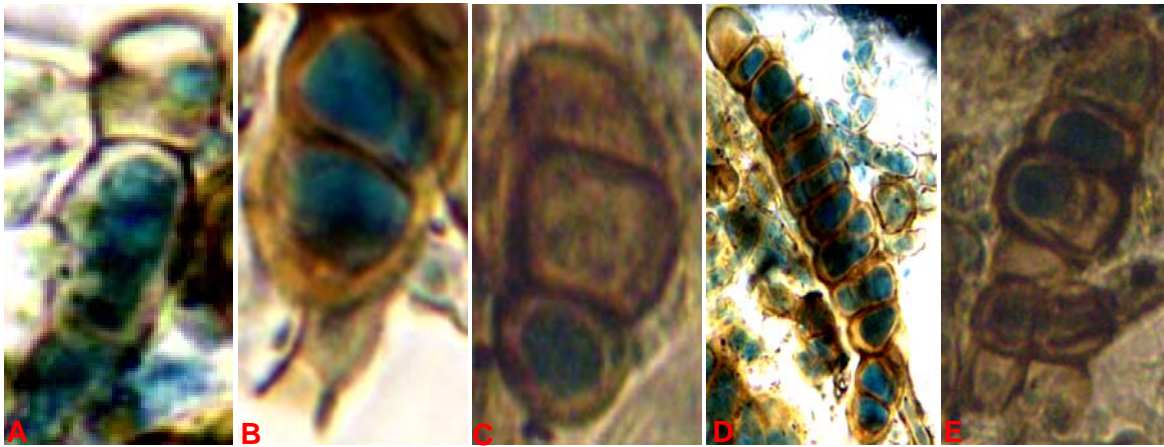


Fig. 1. *Catenulostroma azadirachta*: (A-E). A. Conidiogenous cell; B. uniseptate conidium; C. biseptate conidium. (A, B, C, 1000X), D. conidium with conidiophore (400X); E. Conidium. (D & E, 1000X).

Crous *et al.*, (2007) were of the opinion that *Mycosphaerella* is polyphyletic, while previous studies showed it a monophyletic. A new family Teratosphaeraceae was erected to accommodate in taxa.

Teratosphaeria. An anamorphic genus *Catenulostroma* was also described and it is characterized by biotrophic nature, Conidiomata sporodochial. Mycelium well branched and radiate from conidiomata. Conidiogenous cell without annellations. Conidia in simple or branched basipetal chain, transversely 1-many septate, longitudinal and oblique septa present. Occasionally distosepta are present and its telomorph is *Teratosphaeria*. *Catenulostroma* is closely related to *Trimmatostroma*. Crous *et al.*, (2007) transferred several *Trimmatostroma* spp. to *Catenulostroma* and made several new combination. therefore under study fungus not only compared with *Catenulostroma* spp. But it is mainly also compared with *Trimmatostroma* spp.

The following *Trimmatostroma* spp have been transferred to other genera. *Trimmatostroma abietis* Butin & Pehl, in Butin, Pehl, Hoog & Wollenzien, *Antonie van Leeuwenhoek* 69(3): 204(1996) changed to *Catenulostroma abietis* (Butin & Pehl) Crous & U. Braun, in Crous, Braun & Groenewald, *Stud. Mycol.* 58: 15; *Trimmatostroma elginense* Joanne E. Taylor & Crous, *Mycol. Res.* 104(5): 633 (2000) changed to *Catenulostroma elginense* (Joanne E. Taylor & Crous) Crous & U. Braun, in Crous, Braun & Groenewald, *Stud. Mycol.* 58: 16 (2007); *Trimmatostroma excentricum* B. Sutton & Ganap., *N.Z. J. Bot.* 16(4): 529 (1978), (Conidia 9-11x3-4 μ m) changed to *Catenulostroma excentricum* (B. Sutton & Ganap.) Crous & U. Braun, in Crous, Braun & Groenewald, *Stud. Mycol.* 58: 10(2007); *Trimmatostroma microsporium* Joanne E. Taylor & Crous, *Mycol. Res.* 104(5): 631 (2000) changed to *Catenulostroma microsporium* (Joanne E. Taylor & Crous) Crous & U. Braun, in Crous, Braun & Groenewald, *Stud. Mycol.* 58: 10(2007); *Trimmatostroma protearum* Crous & M.E. Palm, *Mycol. Res.* 103(10): 1303 (1999) changed to *Catenulostroma protearum* (Crous & M.E. Palm) Crous & U. Braun, in Crous, Braun & Groenewald, *Stud. Mycol.* 58: 17(2007); and *Trimmatostroma lichenicola* M.S. Christ & D. Hawksw., in Hawksworth, *Bull. Br. Mus. nat. Hist., Bot.* 6(3): 264 (1979) changed to *Intralichen lichenicola* (M.S. Christ & D. Hawksw.) D. Hawksw. & M.S. Cole, *Fungal Diversity* 11:

93 (2002). Telomorph of *Trimmatostroma macowanii* (Sacc.) M.B. Ellis, *More Dematiaceous Hyphomycetes* (Kew): 29 (1976), changed to *Catenulostroma macowanii* (Sacc.) Crous & U. Braun (2007) and *Teratosphaeria macowanii* (Sacc.) Crous, *Persoonia* 23: 115 (2009) is its current name.

Under study fungus belonging to *Catenulostroma* can be easily differentiated by having bigger conidia (45.6-182.4x7.6-15.2 μ m) from the following *Trimmatostroma* spp. *Trimmatostroma abietina* Doherty 1900, (Conidia 18-20x6-7 μ m); *Trimmatostroma amentorum* Bres. & Sacc., *Malpighia* 11: 324 (1897), (Conidia 18-27x8-9 μ m); *Trimmatostroma americana* Thüm in *Myc. Univ.* No793. In *Sacc. Syll. Fung.* 4: 757 (1886), (Conidia 20-25x4-5- μ m); (Conidia μ m); *Trimmatostroma betulinum* (Corda) S. Hughes, *Can. J. Bot.* 31: 628 (1953), (Conidia 5-20x5-14- μ m); *Trimmatostroma brecklei* Sacc., *Annls mycol.* 13(2): 124 (1915), (Conidia 20-40x5-6- μ m) *Trimmatostroma eriodictyonis* (Dearn. & Barthol.) M.B. Ellis, *More Dematiaceous Hyphomycetes* (Kew): 28 (1976), (Conidia 14-50x7-26- μ m); *Trimmatostroma fructicola* (Sacc.) Sacc., *Syll. fung.* (Abellini) 4: 757 (1886), (Conidia 8-10x2-3- μ m); *Trimmatostroma hughesii* V.G. Rao & Subhedar, *Mycopathologia* 58(2): 79 (1976), (Conidia 4-10x4-8 - μ m); *Trimmatostroma liriodendri* G.F. Atk., *Annls mycol.* 6(1): 60 (1908), (Conidia 12-20 x 5-7- μ m); *Trimmatostroma macowanii* (Sacc.) M.B. Ellis, *More Dematiaceous Hyphomycetes* (Kew): 29 (1976), (Conidia 8-20 x 5-7- μ m) name has been changed to *Teratosphaeria macowanii* (Sacc.) Crous, *Persoonia* 23: 115 (2009); *Trimmatostroma padi* Rostr., *Skr. Vidensk.Selsk. Christiania, Kl. I, Math.-Natur.* 4: 40 (1904), (Conidia 9-12 x 18-30 μ m); *Trimmatostroma platense* (Speg.) Van Warmelo & B. Sutton, *Mycol. Pap.* 145: 35 (1981), (Conidia 10-25x7-15 - μ m); *Trimmatostroma quercinum* (Hoffm.) Höhn., *Mitt. bot. Inst. tech. Hochsch. Wien* 6: 115 (1929), (Conidia 4-9 μ m dia.); *Trimmatostroma salicis* Corda, *Icon. fung.* (Prague) 1: 9 (1837), (Conidia 12-38x4-10- μ m); *Trimmatostroma salinum* Zalar, de Hoog & Gunde-Cim., *Stud. Mycol.* 43: 57 (1999), (Conidia 5-22x10-22 - μ m); *Trimmatostroma undulatum* (McAlpine) J.L. Crane & Schokn., *Mycologia* 78(1): 86 (1986), (Conidia 11-18x10-12 - μ m).

Since under study fungus does not match any species of *Trimmatostroma* spp., and *Catenulostroma* spp. however it is closely related to *Catenulostroma*, than *Trimmatostroma* therefore a new species in *Catenulostroma azadirachta* is proposed.

Specimen examined *Catenulostroma azadirachta* on *Azadirachta indica*; Samanabad Gojra Pakistan; 25 April, 07; G.C.U.F. Mycol.H. # 35; S.Q.Abbas & N. Iftikhar.

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