

## SPECIES, HOST RANGE AND GEOGRAPHICAL DISTRIBUTION OF MICROFUNGI (DOTHIDEOMYCETES) ON INTRODUCED TREES AND SHRUBS IN SOUTHERN UZBEKISTAN

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A comprehensive review of the species, host ranges and geographical distribution of microfungi (Dothideomycetes) on introduced trees and shrubs in southern Uzbekistan are presented. The listed 31 species of Dothideomycetes microfungi belonging to 11 genera, 7 families and 3 orders are recorded in Southern Uzbekistan. From them 2 species (*Camarosporium meliae* Annal, *Pleospora spegazziniana* Sacc, are reported for the first time from Uzbekistan. According to our results these fungi are recorded on 25 host plant species.

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قارچهای میکروسکوپی دو تیومیست، گیاهان میزبان و پراکندگی جغرافیایی آنها روی درختان و درختچه های غیر بومی جنوب ازبکستان  
جمیلا پایانونا شرکولوا: دپارتمان میکروبیولوژی و بیوتکنولوژی دانشگاه ایالتی کارشی، جمهوری ازبکستان  
ایلیور مورادولایویچ مصطفی او: آزمایشگاه قارچ شناسی و جلبک شناسی، مؤسسه گیاه شناسی، آکادمی علوم جمهوری ازبکستان  
مالیکا ماشرابونا ایمینوا: آزمایشگاه قارچ شناسی و جلبک شناسی، مؤسسه گیاه شناسی، آکادمی علوم جمهوری ازبکستان  
عبدومورود ساتوروویچ ساتورو: رییس دپارتمان گیاه شناسی دانشگاه ایالتی ترمیز، جمهوری ازبکستان  
مروری جامع بر روی گونه های قارچ های میکروسکوپی Dothideomycetes بر روی درختان و درختچه های غیر بومی ازبکستان ارائه می گردد.  
لیست ۳۱ گونه قارچ میکروسکوپی گروه Dothideomycetes متعلق به یازده جنس و ۷ خانواده و ۳ راسته از جنوب ازبکستان گزارش می گردند.  
از میان آنها دو گونه شامل *Camarosporium meliae* Annal, *Pleospora spegazziniana* Sacc. بر اولین بار از ازبکستان گزارش می گردند.  
بر اساس نتایج ما این قارچ ها از روی ۲۵ گیاه میزبان گزارش می گردند.

### INTRODUCTION

The territory of Southern Uzbekistan includes the Kashkadarya and Surkhandarya regions that are located in the south of Central Asia. It borders in the north with the Samarkand and Bukhara regions of Uzbekistan, in the east with Tajikistan, in the west with Turkmenistan, and in the south Afghanistan. The southern boundary of

the region runs along the Amu Darya River, which is the border between Uzbekistan and Afghanistan. Southern Uzbekistan covers 48,500 km<sup>2</sup> (18,800 sq miles).

Dothideomycetes are a largest class of the phylum Ascomycota with 19000 species belonging to 1300 genera, 11 orders and 90 families (Kirk & al., 2008).

The best known members of this class are several important plant pathogens (like *Phaeosphaeria nodorum* and *Venturia inaequalis*). However, a majority of described species are either found as endophytes or saprobes growing on woody debris, decaying leaves or dung (Nelsen & al., 2009).

In the territory of southern Uzbekistan grow 215 species of introduced plants belonging to 113 genera and 52 families (Yoziyev, 2001).

Studies on microfungi biota of Uzbekistan were first started by Zaprometov (1926, 1928) and followed by Golovin (1947, 1949a,b, 1950); Kleiner (1958); Lebedeva (1958); Gaponenko (1959, 1965); Baymuratova (1963); Panfilova & Gaponenko (1963); Sagdullaeva (1965); Usmonov (1965); Axmedova (1966); Kravcova (1969); Kirgizbaeva (1972); Kuchmi (1970); Nazarov (1971); Eshonkulov (1973); Ibadov (1973); Gulyamova (1975); Ramazanova (1975); Shtok (1982); Zuparov (1984); fungal flora of Uzbekistan 1990-1997; Kamilov (1991); Khasanov (1992); Xolmurodov (1994); SHERALIEV (2001); Solieva & Gafforov (2001); Solieva & al. (2007); Nuraliev (1999); Gafforov (2016, 2017). However, diversity of fungi on introduced plants in Southern Uzbekistan has not studied.

## MATERIALS AND METHODS

Between 2014 and 2017 the intensive study of microfungi, samples were collected from various introduced woody and shrubby plants in Karshi, Shakhrisabz and Termez cities (Southern Uzbekistan). Samples were dried at room temperature in paper bags and were deposited in Tashkent mycological herbarium (TASM) of the Institute of Botany and Zoology (IBZ). The main method of identifying the species of fungi was light microscopy, carried out according to standard procedures. Measurements were made from slide stained preparations observed under a Motic BA410 light microscope in the Mycology Laboratory of the IBZ. Species identification was performed according to Morochkovski & al., 1969, 1971, Juravlev & al. 1979, Conrad & al., 2009. Fungal names are given in according with <http://www.mycobank.org>, host plants are given with <http://www.theplantlist.org>. New records of Dothideomycetes species for Uzbekistan, were shown by asterix (\*).

## RESULTS

A total of 31 species of Dothideomycetes microfungi belonging to 11 genera, 7 families and 3 orders were recorded in Southern Uzbekistan. According to our results these fungi recorded 25 host

plant species. However, it is expected that more collections and further taxonomic studies will substantially increase our knowledge on the presence of these fungi in Southern Uzbekistan.

## Taxonomy

**Ascomycota** (Berk.) Caval. -Sm.

**Pleosporales** Luttrell ex M.E. Barr

**Pleosporaceae** Nitschke

*Alternaria* Nees

*A. alternata* (Fr.) Keissl.

Host – *Rosa multiflora* Thunb. Karshi, JP-K018, 03.08.2014, Karshi, JP-K052, 07.08.2016.

Host – *Seguoiadendron giganteum* Lindl. Shakhrisabz, JP-Sh016, 07.05.2016, Shakhrisabz, JP-Sh017, 7.08.2016,

Host – *Acer negundo* L. Host – *Catalpa bignonioides* Walt., Host – *Sophora japonica* L., Host – *Biota orientalis* (L)Ende. Termez, JSh-T11, 26.08.2016.

Host – *Pinus eldarica* Medw., *Populus alba* L. Termez, JP-013, 26.08.2016,

*A. solani* Sorauer, Z. Pfl Krankh. PflPath. PflSchutz: 6, t. 1:2 (1896) [MB#444460].

Host–*Juniperus virginiana* L. Karshi, JP- K 011, 14.10.2014.

*A. tenuissima* (Nees) Wiltshire, Transactions of the British Mycological Society 18 (2): 157 (1933) [MB#280005].

Host–*Populus alba* L. Shakhrisabz, JP-Sh 013, 6.08.2016.

*A. tenuis* Link, Caroli a Linné Species Plantarum exhibentes Plantas Rite Cognitas ad Genera Relatas 6(1): 127 (1824) [MB#497136]– Link.

Host– *Sophora japonica* L. Karshi, JP-K030, 15.08.2014, Karshi, JP-K033, 03.08.2016.

*Camarosporium* Schulzer.

*C. meliae* Annal.\*, Vestn. Moskov. Univ. Ser. biol.: 58 (1960) [MB#283011].

Host – *Melia azedarach* L. On dead branches. Karshi, JP- K025, 15.04.2015. Karshi, JP- K082, 28.03.2017.

Conidiomata immersed to erumpent, solitary or group with central ostiole, globose, brown, 300-330 µm diam. Conidia brown, ellipsoid, with obtuse ends, 18-19.5x10-11µm, 1-3 transversely septate, 1 longitudinal septa (fig.1).

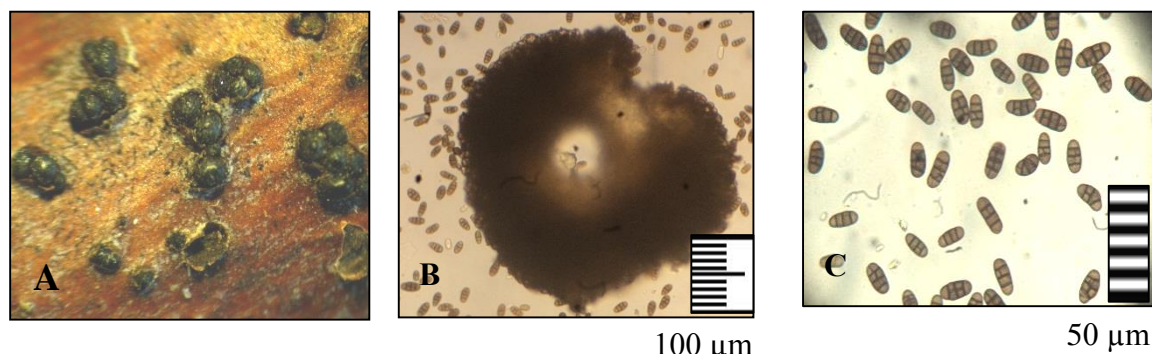


Fig. 1. *Camarosporium meliae* Annal.- *Melia azedarach* L. A, conidiomata scattering on the host surface; B & C, picnida and conidia (Photo by J. Sherkulova).

*Pleospora* Rabenh. ex Ces. & De Not.

*Pleospora spetzianiana* Sacc.\*

Host – *Catalpa bignonioides* Walter. Karshi, JP-K081, 16.05.2017.

#### Leptosphaeriaceae M.E.Barr.

*Coniothyrium* Corda

*C. negundinis* Tehon & E.Y. Daniels, Mycologia 17 (6): 243 (1925) [MB#173919]. Host – *Acer negundo* L. Karshi, JP-Sh087, 4.05.2016,

*Microsphaeropsis olivacea* (Bonord.) Höhn., Hedwigia 59: 267 (1917) [MB#438686].

Host – *Cercis canadensis* L. Karshi, JP-Sh086, 4.05.2016,

#### Venturiaceae E.Müll. & Arx ex M.E.Barr.

*Fusicladium* Bonord.

*F. radiosum* (Lib.) Lind, Annales Mycologici 3 (5): 429 (1905) [MB#179286].

Host – *Populus alba* L. Shakhrisabz, JP-Sh039, 7.08.2016. Termez, JP-T033, 19.05.2016.

*F. salicis* (Moesz & Smarods) U. Braun & K. Schub., Schlechtendalia 16: 73(2007) [MB#510455].

Host – *Salix alba* L. Karshi, JP-K034, 10.05.2015, Karshi, JP-K038, 22.05.2016.

Capnodiales Woron.

Capnodiaceae (Sacc.) Höhn. ex Theiss.

*Capnodium* Mont.

*C. pini* Berk. & M.A. Curtis, Grevillea 4(32): 157(1876).

Host – *Pinus eldarica* Medw. Karshi, JP-K41, 04.05.2016.

Termez, JP-T08, 19.05.2016, Termez, JP-T23, 27.05.2017.

Recorded from branches of *Catalpa bignonioides*.

Host – *Catalpa bignonioides* Walter. Karshi, JP-K081, 16.05.2017.

Recorded from branches of *Catalpa bignonioides*.

*C. salicinum* Mont., Annales des Sciences Naturelles BotaniKue 11: 234 (1849) [MB#168391]. Host – *Ulmus pumila* L. Karshi, JP-K012, 04.05.2016.

*Capnodium* sp.

Host – *Biota orientalis* (L) Endl. Karshi, JP-K036, 04.05.2016.

*Metacapnodium juniperi* (W. Phillips & Plowr.) Speg., Physis Revista de la Sociedad Argentina de Ciencias Naturales 4(17): 288(1918) [MB#212907].

Host – *Juniperus virginiana* L. Karshi, JP-K015, 23.03.2016.

Termez, JP-021, 19.05.2016, Termez, JP-T24, 27.05.2017.

#### Mycosphaerellaceae Lindau, Nat.

*Cercospora* Fresen.

*Cercospora* sp.

Host – *Robinia pseudacacia* L. Karshi, JP-K037, 27.06.2016.

*Cladosporium* Link.

*C. herbarum* (Pers.) Link, Magazin der Gesellschaft Naturforschenden Freunde Berlin 8: 37 (1816) [MB#231458].

Host – *Tilia corda* Mill. Shakhrisabz, JP-Sh032, 18.05.2016.

Host – *Hibiscus syriacus* L. Karshi, JP-K020, 16.07.2014, Karshi, JP-K014, 18.05.2017.

Host – *Pinus eldarica* Medw., *Pinus nigra* Turra. Termez, JP-T28, 19.05.2016, Termez, JP-T29, 27.05.2017.

*Cladosporium* sp. Host – *Biota orientalis* (L) Ende. Shakhrisabz, JP-Sh028, 18.05.2016.

*C. fumago* Mont., Historia Física y Política de Chile. Botánica. Flora Chilena 8: 32(1852) [MB#158541]. Host – *Populus alba* L. Karshi, JP-K031, 8.08.2016.

*Stenella deightoniana* U. Braun, Mycotaxon 92: 404 (2005) [MB#500178] (The former name of the species is *Cladosporium cercestidis*). Host – *Cercis canadensis* L. Karshi, JP-K029, 08.07.2014.

*Fusicladium martianoffianum* (Thüm.) K. Schub. & U. Braun, IMI Descriptions of Fungi and Bacteria 1515 (2002) [MB#384597] (The former name of the species is *Cladosporium martianoffianum* Thüm.) Host – *Populus nigra* L. Karshi, JP-K022, 20.04.2014, Karshi, JP-K088, 28.03.2017.

**Septoria SACC.**  
*S. fraxini* Desm., Plantes Crypt. de France: no. 1086 (1840) [MB#157544]. Host – *Fraxinus sogdiana* Bunge. Karshi, JP-K043, 11.06.2016, Termez, JP-T34, 26.08.2016

*S. populi* Desm., Annales des Sciences Naturelles BotaniKue 19: 345 (1843) [MB#185912]. Host – *Populus nigra* L. Karshi, JP- K044, 27.06.2016.

**Botryosphaeriales** C.L. Schoch,  
**Botryosphaeriaceae** Theiss. & H.Syd.,

**Diplodia** Fr.  
*D. amorphae* (Wallr.) Sacc., Sylloge Fungorum 2: 311 (1883) [MB#166569]. Host – *Amorpha fruticosa* L. Karshi, JP-K054, 14.10.2014, Karshi, JP-K055, 21.05.2017.

*D. koelreuteriae* Sacc., Michelia 2 (6): 60 (1880) [MB#204913]. Host – *Koelreuteria paniculata* Laxm. JP-K057, 21.05.2017.  
Conidiomata up to 200 µm diam., solitary, dark brown to black, globose. Conidia hyaline, 12-13x3-4 µm, ellipsoidal, ovoid with both ends rounded, aseptate, becoming one septate after discharge from the pycnidia (fig. 3).

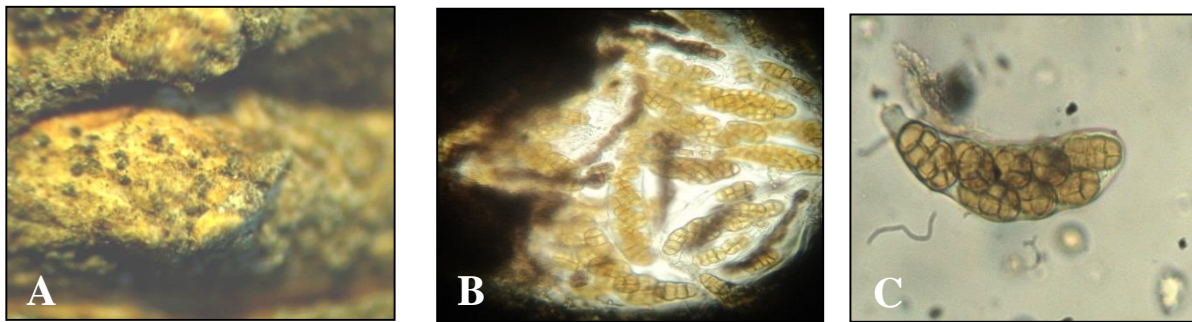


Fig. 2. A, ascomata scattering on the host surface; B & C, asci (Photo by J. Sherkulova).

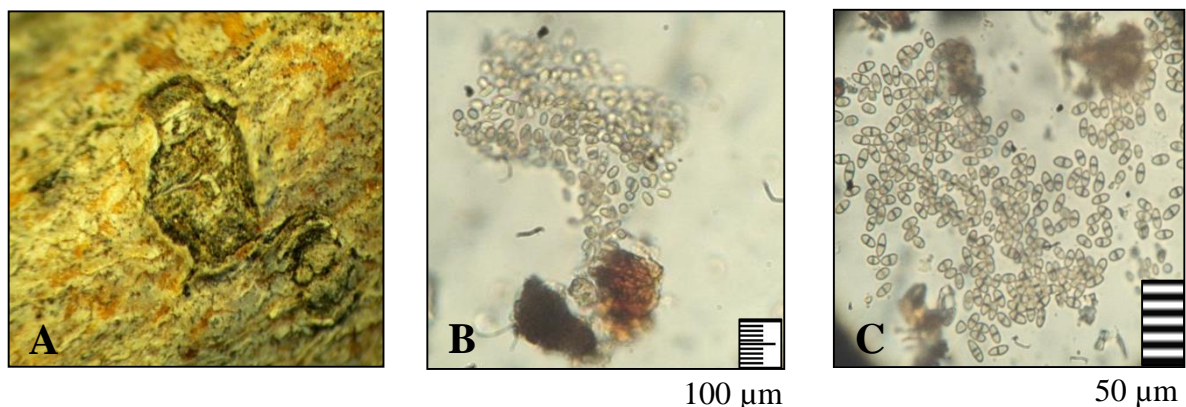


Fig. 3. A, substrate of *D. koelreuteriae*; B & C, conidia (Photo by J. Sherkulova).

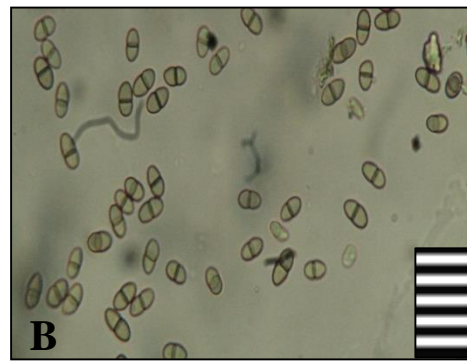


***D. mahoniae*** Sacc., *Michelia* 2 (7): 268 (1881) [MB#245921].

Host – *Mahonia aquifolium* Nutt. Karshi, JP-K010, 14.10.2014, Karshi, JP-K058, 7.08.2016.

***D. populina*** Fuckel, *Jahrbücher des Nassauischen Vereins für Naturkunde* 23-24: 170 (1870) [MB#247753].

Host – *Populus nigra* L. Shakhrisabz, JP-Sh026, 28.09.2014.



50  $\mu$ m

Fig. 4. A, *Diplodia juniperi* on dead branches of *Juniperus virginiana*; B, conidia (Photo by J. Sherkulova).

***D. rosarum*** Fr., *Summa vegetabilium Scandinaviae* 1: 417 (1849) [MB#188723].

Host – *Rosa* sp. Karshi, JP-K061, 20.05.2015, Karshi, JP- K062, 7.08.2016.

***Hendersonia*** Sacc.

***H. ulmea*** P. Karst., *Symb. mycol. fenn.*: 158 (1879) [MB#177609].

Host – *Ulmus pumila* L. Karshi, JP-K085, 28.03.2017.

***Phyllosticta*** Pers.

***Ph. ulmi*** Westend., *Bulletin de l'Academie Royale des Sciences, des Lettres et des Beaux Arts de Belgique* Ser. 2, 2 (7): 570 (1857) [MB#239790].

Host – *Ulmus densa* Litv. Karshi, JP-K80, 11.06.2016.

***Ph. acerina*** Allesch., *Rabenhorst's Kryptogamen-Flora, Pilze - Fungi Imperfecti* 1(7): 751 (1903) [MB#187469].

Host – *Acer negundo* L. Karshi, JP-K042, 26.08.2016.

***Seimatosporium lichenicola*** (Corda) Shoemaker & E. Müll., *Canadian Journal of Botany* 42(4): 403 (1964)[MB#339053] (The former name of the species is *Phyllosticta aesculicola*).

***D. juniperi*** Westend. *Bulletin de l'Academie Royale des Sciences, des Lettres et des Beaux Arts de Belgique* Ser. 2, 2 (7): 560 (1857) [MB#214690]

Host – *Juniperus virginiana* L. Karshi, JP- K083, 28.03.2017.

Conidiomata up to 400  $\mu$ m diam., solitary, dark brown to black, globose. Conidia 17-13x8-11  $\mu$ m, ellipsoidal, ovoid with both ends rounded, one-septate (fig. 4).

Host – *Aesculus hippocastanum* L. Shakhrisabz, JP-Sh09, 7.08.2016,

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