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A checklist of mycobiota on *Pistacia vera* of the Gaziantep province in Turkey

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Abstract: A list of 25 fungi collected on *Pistacia vera* in the Gaziantep province (Turkey) in 2009 and 2010 is presented. Twenty-three taxa were microfungi belonging to the *Ascomycota* and two taxa were macrofungi belonging to the *Basidiomycota*.

Zusammenfassung: Eine Liste von 25 Pilzarten auf *Pistacia vera* aus der türkischen Provinz Gaziantep, gesammelt in den Jahren 2009 und 2010, wird vorgestellt. 23 Taxa sind Mikropilze der *Ascomycota* und zwei Taxa Großpilze der *Basidiomycota*.

The Gaziantep province is located in south-east Anatolia (Turkey). It is bordered by the districts Şanlıurfa's Birecik and Halfeti in the east, Osmaniye's Bahçe in the west, Kahramanmaraş's Pazarcık in the north, Kilis in the south, Hatay's Hassa in the south-west, and Adıyaman in the north-east. The southern and western sectors of the province have moderate semi-continental climate; nevertheless, the centre of Gaziantep city, especially in east and north sections, has moderate continental climate (Fig. 1). The main part of the Gaziantep province lies within the southeastern Anatolian steppe area. The northwestern part of the province is a transition area between Mediterranean vegetation and south eastern Anatolian steppe vegetation.

Pistachio, *Pistacia vera* L., is a native species in Turkey, Iran and Afghanistan (ÜLKÜMEN & ÖZBEK 1950). It has been cultivated since the Hittites in the Anatolian region. Gaziantep province is one of the biggest pistachio production places and the leading exporter in Turkey. The aim of the present study was the identification of mycobiota on *Pistacia vera* in Turkey.

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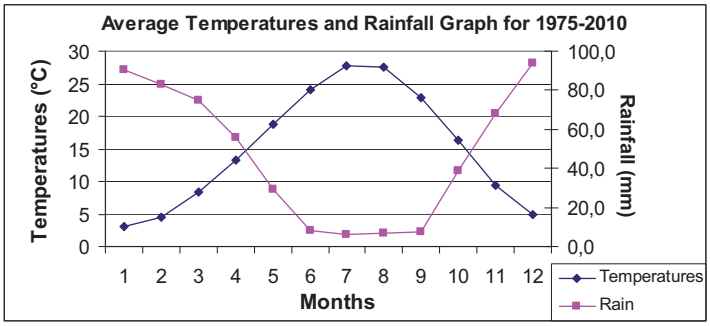

Fig 1. Average of 35 years of monthly temperatures and rainfall for Gaziantep province.

Materials and methods

Specimens of fungi were collected during periodical field trips from different localities in Gaziantep province in the years 2009 and 2010. Leica light microscopes and Olympus stereo microscopes were used. Identification of taxa followed BIZOVA & VASYAGINA (1981), DOMSCH & al. (2007), ELLIS & ELLIS (1987), FROLOV (1967), DE HOOG & al. (2000) MEREJKO (1980), NOBLES (1948), SACCARDO (1881-1931), SAMSON & al. (2002), SHVARTSMAN & al. (1975), SMITSKAYA & al. (1986), TETEREVNIKOVA-BABAYAN (1987), and YACHEVSKY (1917). The specimens are kept at Gaziantep University, Science and Arts Faculty, Department of Biology. Short descriptions, localities, collection dates and registration numbers are given. The author abbreviations of fungi follow KIRK & al. (2008) and INDEX FUNGORUM (2012).

Species list

Ascomycota

Botryosphaeriaceae

Diplodia pistaciae **BERL. & BRES.**
C6 Gaziantep: Araban, between Araban-Yavuzeli, at Karadağ Mountain hillside, 37° 23’ 44’’ N, 37° 33’ 71’’ E, 623 m s. m., 08. 07. 2010, DY 40; Nizip, 3 km from Zeugma to Nizip, 37° 02’ 22’’ N, 37° 50’ 60’’ E, 479 m s. m., 29. 06. 2010, DY 700.

Coniochaetaceae

Coniochaeta pulveracea **(EHRH.) MUNK**
C6 Gaziantep: Araban, between Araban-Yavuzeli, at Karadağ Mountain hillside, 37° 23’ 44’’ N, 37° 33’ 71’’ E, 623 m s. m., 08. 07. 2010, DY 40; Karkamış, after 2 km of EUAŞ Karkamış Hydroelectric Power Station, 36° 51’ 92’’ N, 38° 00’ 65’’ E, 358 m s. m., 30. 06. 2010, DY 2000.

Davidiellaceae

Cladosporium herbarum **(PERS.) LINK**
C6 Gaziantep: Oğuzeli, near Kayacık dam, 36° 49’ 58’’ N, 37° 34’ 65’’ E, 620 m s. m., 30. 06. 2010, DY 1000; Oğuzeli, Sazgın village, 36° 52’ 75’’ N, 37° 29’ 61’’ E,

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669 m s. m., 30. 06. 2010, DY 800.

Mycosphaerellaceae

Mycosphaerella pistacina **CHITZAN**.
C6 Gaziantep: Karkamış, after 1 km of EUAŞ Karkamış Hydroelectric Power Station, 36° 51' 92'' N, 38° 00' 65'' E, 356 m s. m., 30. 06. 2010, DY 1000; Karkamış, Yurtbağ village, 36° 51' 16'' N, 38° 00' 52'' E, 362 m s. m., 30. 06. 2010, DY 3000.

Septoria pistaciae **DESM**.
C6 Gaziantep: Araban, top of Karadağ Mountain, 37° 21' 23'' N, 37° 32' 75'' E, 945 m s. m., 08. 07. 2010, DY 50; Yavuzeli, Halilbaşlı village junction, 37° 15' 49'' N, 37° 32' 54'' E, 724 m s. m., 08.07. 2010, DY 70.

Incertae sedis

Bispora antennata (**PERS**.) E. W. **MASON**
C6 Gaziantep: Araban, at the top of Karadağ Mountain, 37° 21' 23'' N, 37° 32' 75'' E, 945 m s. m., 08. 07. 2010, DY 50; Araban, between Araban-Yavuzeli at Karadağ Mountain hillside, 37° 23' 44'' N, 37° 33' 71'' E, 623 m s. m., 08. 07. 2010, DY 40.

Coniothecium complanatum **(NEES) SACC.**
C6 Gaziantep: Nizip, 3 km from Zeugma to Nizip, 37° 02' 22'' N, 37° 50' 60'' E, 479 m s. m., 29. 06. 2010, DY 700; Oğuzeli, near Kayacık dam, 36° 49' 58'' N, 37° 34' 65'' E, 620 m s. m., 30. 06. 2010, DY 1000.

Phoma pulchella **(BERK. & BROOME) SACC.**
C6 Gaziantep: Oğuzeli, Ekinveren village, 36° 57' 71'' N, 37° 35' 90'' E, 587 m s. m., 30. 06. 2010, DY 800; Şehitkamil, Gaziantep University campus, 37° 02' 08'' N 37° 18' 21'' E, 890 m s. m., 30. 06. 2010, DY 10.

Strickeria pistaciae **BONDARTSEVA**
C6 Gaziantep: Oğuzeli, Sazgın village, 36° 52' 75'' N, 37° 29' 61'' E, 669 m s. m., 30. 06. 2010, DY 800.

Nectriaceae

Fusarium oxysporum **SCHLTDL.**
C6 Gaziantep: Karkamış, Alaçalı village, 36° 49' 88'' N, 37° 45' 72'' E, 492 m s. m., 30. 06. 2010, DY 7000; Oğuzeli, Sazgın village, 36° 52' 75'' N, 37° 29' 61'' E, 669 m s. m., 30. 06. 2010, DY 800.

Gibberella intricans **WOLLENW.**
C6 Gaziantep: Karkamış, Alaçalı village, 36° 49' 88'' N, 37° 45' 72'' E, 492 m s. m., 30. 06. 2010, DY 7000; Karkamış, Çiftlikköy village, 36° 49' 86'' N, 37° 46' 58'' E, 496 m s. m., 30. 06. 2010, DY 6000.

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Gibberella zeae **(SCHWEIN.) PETCH**
C6 Gaziantep: Araban, between Araban-Yavuzeli districts, 37° 27' 98'' N, 37° 42' 49'' E, 587 m s. m., 08. 07. 2010, DY 30; Şehitkamil, between Gaziantep Middle East Fair Center-Yavuzeli, 37° 12' 40'' N, 37° 29' 14'' E, 764 m s. m., 08. 07. 2010, DY 100.

Pleomassariaceae

Stegonosporium irregulare **LAMBOTTE & FAUTREY**
C6 Gaziantep: Araban, between Araban-Yavuzeli districts, 37° 27' 98'' N, 37° 42' 49'' E, 587 m s. m., 08. 07. 2010, DY 30.

Pleosporaceae

Alternaria alternata **(FR.) KEISSL.**
C6 Gaziantep: Nizip, Belkıs (Zeugma) area, 37° 02' 22'' N, 37° 50' 60'' E, 479 m s. m., 29. 06. 2010 DY 600; Şehitkamil, Gaziantep University campus, 37° 02' 08'' N 37° 18' 21'' E, 890 m s. m, 30. 06. 2010, DY 10.

Alternaria tenuissima **(KUNZE) WILTSHIRE**
C6 Gaziantep: Araban, between Araban-Yavuzeli, at Karadağ Mountain hillside, 37° 23' 44'' N, 37° 33' 71'' E, 623 m s. m., 08. 07. 2010, DY 40; Şehitkamil, between Gaziantep Middle East Fair Center-Yavuzeli, 37° 12' 40'' N, 37° 29' 14'' E, 764 m s. m., 08. 07. 2010, DY 100.

Sclerotiniaceae

Botrytis cinerea **PERS.**
C6 Gaziantep: Araban, between Araban-Yavuzeli, at Karadağ Mountain hillside, 37° 23' 44'' N, 37° 33' 71'' E, 623 m s. m., 08. 07. 2010, DY 40; Karkamış, Alaçalı village, 36° 49' 88'' N, 37° 45' 72'' E, 492 m s. m., 30. 06. 2010, DY 7000.

Trichocomaceae

Aspergillus brasiliensis **VARGA, FRISVAD & SAMSON**
C6 Gaziantep: Araban, between Araban-Yavuzeli, at Karadağ Mountain hillside, 37° 23' 44'' N, 37° 33' 71'' E, 623 m s. m., 08. 07. 2010, DY 40; Oğuzeli, Ekinveren village, 36° 57' 71'' N, 37° 35' 90'' E, 587 m s. m., 30. 06. 2010, DY 800.

Aspergillus flavus **LINK**
C6 Gaziantep: Şehitkamil, Gaziantep University campus, 37° 02' 08'' N 37° 18' 21'' E, 890 m s. m., 30. 06. 2010, DY 10; Yavuzeli, Halilbaşlı village junction, 37° 15' 49'' N, 37° 32' 54'' E, 724 m s. m., 08. 07. 2010, DY 70.

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***Aspergillus fumigatus* FRESEN.**
C6 Gaziantep: Nizip, 3 km from Zeugma to Nizip, 37° 02' 22'' N, 37° 50' 60'' E, 479 m s. m., 29. 06. 2010, DY 700; Şehitkamil, between Gaziantep Middle East Fair Center-Yavuzeli, 37° 12' 40'' N, 37° 29' 14'' E, 764 m s. m., 08. 07. 2010, DY 100.

***Penicillium decumbens* THOM**
C6 Gaziantep: Nizip, Belkıs (Zeugma) area, 37° 02' 22'' N, 37° 50' 60'' E, 479 m s. m., 29. 06. 2010 DY 600; Oğuzeli, near Kayacık dam, 36° 49' 58'' N, 37° 34' 65'' E, 620 m s. m., 30. 06. 2010, DY 1000.

Valsaceae

***Cytospora sarothamni* SACC.**
C6 Gaziantep: Araban, top of Karadağ Mountain, 37° 21' 23'' N, 37° 32' 75'' E, 945 m s. m., 08. 07. 2010, DY 50.

***Cytospora terebinthi* BRES.**
C6 Gaziantep: Karkamış, Kıvırcık village, 36° 50' 05'' N, 37° 56' 53'' E, 398 m s. m., 30. 06. 2010, DY 4000.

Xylariaceae

***Rosellinia pistaciae* FROLOV**
C6 Gaziantep: Araban, top of Karadağ Mountain, 37° 21' 23'' N, 37° 32' 75'' E, 945 m s. m., 08. 07. 2010, DY 50; Karkamış, after 1 km of EUAŞ Karkamış Hydroelectric Power Station, 36° 51' 92'' N, 38° 00' 65'' E, 356 m s. m., 30. 06. 2010, DY 1000.

Basidiomycota

Hymenochaetaceae

***Phellinus rimosus* (BERK.) PILÁT**
C6 Gaziantep: Şehitkamil, Gaziantep University campus, 37° 02' 08'' N 37° 18' 21'' E, 890 m s. m., 30. 06. 2010, DY 10.

Polyporaceae

***Fomes fomentarius* (L.) J. J. KICKX**
C6 Gaziantep: Şehitkamil, between Gaziantep Middle East Fair Center-Yavuzeli, 37° 12' 40'' N, 37° 29' 14'' E, 764 m s. m., 08. 07. 2010, DY 100; Şehitkamil, Gaziantep University campus, 37° 02' 08'' N 37° 18' 21'' E, 890 m s. m., 30. 06. 2010, DY 10.

Discussion

The 25 species found on *Pistacia vera* are 23 *Ascomycota* belong to five classes, ten orders, 12 families and 18 genera and two *Basidiomycota* belonging to two classes, two orders, two families and two genera.

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Only a few studies have been carried out about fungi on pistachio in Turkey. DENIZEL & al. (1976) reported that the predominant soil fungus was *Aspergillus niger*. Isolates of *Fusarium*, *Trichoderma*, *Mucor* and *Rhizopus* species were common soil fungi in three major pistachio production areas of Turkey. ESKALEN & al. (2001) identified several pathogenic fungi, namely *Septoria pistaciarum* CARACC., *Verticillium dahliae* KLEB., *Phyllactinia angulata* (E. S. SALMON) S. BLUMER, *Phytophthora* spp., *Fusarium equiseti* (CORDA) SACC., *Nematospora coryli* PEGLION, *Aureobasidium pullulans* (DE BARY) G. ARNAUD and *Aspergillus niger* in pistachio production areas in East-Mediterranean and Southeast Anatolian regions of Turkey.

MICHAILIDES & al. (1994) gave a list of fungal diseases of pistachio (*Pistacia vera*) reported in California: *Verticillium* wilt caused by *Verticillium dahliae*, *Botrytis* blossom and shoot blight caused by *Botrytis cinerea* PERS., Alternata late blight caused by *Alternaria alternata*, *Botryosphaeria* panicle and shoot blight caused by *Botryosphaeria dothidea* (MOUG.) CES. & DE NOT., *Armillaria* root rot caused by *Armillaria mellea* (VAHL) P. KUMM., *Schizophyllum* wood decay caused by *Schizophyllum commune* FR., *Sclerotinia* shoot blight caused by *Sclerotinia sclerotiorum* (LIB.) DE BARY, *Phomopsis* shoot blight caused by *Phomopsis* spec.; powdery mildew caused by an unidentified species of *Erysiphales,* and *Septoria* leaf and fruit spot caused by *Septoria pistaciae* in California or *Septoria pistaciarum* in Arizona. HEPERKAN & al. (1994) investigated pistachio storage areas and they reported that *Aspergillus*, *Penicillium*, *Cladosporium,* and *Rhizopus* were predominant fungi; *Ulocladium*, *Trichothecium*, *Aureobasidium,* and *Eurotium* were less frequent fungi on deposited pistachio fruits. BILGRAMI & GHAFFAR (1994) published a list of pistachio fruits collected from different areas of Pakistan, and they identified nine genera and 22 species: *Alternaria alternata*, *A. tenuissima*, *Aspergillus candidus* LINK, *A. clavatus* DESM., *A. flavus*, *A. fumigatus*, *A. niger*, *A. sulphureus* DESM,. *A. terreus* THOM, *A. wentii* WEHMER, *Aspergillus* spp., *Chaetomium* spp., *Cladosporium* spec., *Drechslera* state of *Cochliobolus spicifer* R. R. NELSON, *Fusarium equiseti*, *F. oxysporum*, *Fusarium* spp., *Penicillium camemberti* THOM, *P. decumbens*, *Penicillium* spp., *Rhizopus* spec. and *Trichoderma harzianum* RIFAI.

LIGOXIGAKIS (2000) reported *Verticillium dahliae* for the first time in Greece. *Alternaria alternata* was reported for the first time in Australia (ASH & LANOISELET 2001). WEI-QUN & al. (2002) reported 26 genera, representing 56 fungal species, including four *Ascomycetes*, one Basidiomycete, 48 mitosporic fungi, two *Zygomycetes* and one yeast on samples of leaves, buds, fruits and fruit clusters in the Central Valley, California. They recorded 44 fungi for the first time from pistachio in the world. LIGOXIGAKIS & al. (2002) reported *Pistacia vera* as a host of *Verticillium dahliae* in Kriti (Greece). ELENAA & VLAHOYIANNIS (2003) reported *Botrytis cinerea* for the first time out of California in Greece. *Alternaria, Aspergillus, Cladosporium, Eurotium, Fusarium, Penicillium, Trichoderma, Ulocladium, Epicoccum,* and *Rhizopus* were reported as common saprotrophic microfungi genera decaying pistachio buds (MICHAILIDES 2006).

The result of our study are 25 fungi found on *Pistacia vera* in Turkey contributing to mycological knowledge in Turkey, complementing deficiency in literature and creating a significant source for further studies.

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