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## The Powdery Mildew Fungi of Aladağlar and Bolkar Mountains in Turkey

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**Abstract:** In this study, sixty-one species of Powdery mildew (Erysiphales) in Aladağlar and Bolkar mountains were determined. The research was carried out between 2013 and 2016. The sixty-one species of Powdery mildew were observed from 37 family, 83 genera and 94 host species and make a contribution to Turkish mycobiota.

**Key words:** *Erysiphales*, New records, Parasite, Turkey

### Aladağlar ve Bolkar Dağları (Türkiye) Külleme Mantarları

**Öz:** Bu çalışmada Aladağlar ve Bolkar dağlarında bulunan 61 külleme mantarı ve konakçıları tanımlanmıştır. Çalışma 2013 ve 2016 yılları arasında yapılmıştır. 61 külleme türü 37 familya, 83 cins ve 94 tür konakçı üzerinde belirlenmiştir ve Türkiye mycobiotasına katkılar sağlanmıştır.

**Anahtar kelimeler:** *Erysiphales*, Yeni kayıtlar, Parazit, Türkiye

#### Introduction

The powdery mildews (Erysiphales) represent a large group of common, obligate plant pathogens of cosmopolitan distribution, usually easily recognizable by their obvious symptoms, i.e. superficial white powdery patches or films of the anamorphic, composed of mycelium, conidiophores and conidia, on leaves, stems and other plant organs. Powdery mildews are assigned to an order and to a family of its own. The economic importance of these fungi in phytopathology and plant protection is enormous. Some species cause serious damages on a number of cultivated plants, such as cereals, vegetables, flowers, fruit trees, ornamental plants, etc. (Braun and Cook 2012).

According to the checklist on Turkish powdery mildews and recent literature (Akata et al., 2019; Akdeniz and Sert, 2019; Kabaktepe et al., 2015, Churakov et al., 2018), 143 species belong to 14 teleomorphic and anamorphic genera and they were observed on 674 host plants species within the 322 genera and 72 families.

On the other hand, Turkey is one of the most comprehensively explored regions of powdery mildews in the world.

The purpose of the current study is to determine the powdery mildews (Erysiphales) of Aladağlar and Bolkar mountains and make a contribution to mycobiota of Turkey.

#### Material and Method

Host plants were collected from Aladağlar and Bolkar mountains (Kayseri, Niğde, Konya, Karaman, Mersin, Adana) in Turkey between 2013 and 2016. The Flora of Turkey (Davis, 1965-1985; Davis et al., 1988) was the main source used for the identification of the host specimens. Morphological observations of herbarium specimens were conducted according to the procedure outlined in Kabaktepe and Akata. (2019).

Herbarium samples used in this study were deposited into İnönü University herbaria (INU).

While systematic of the fungal taxa were in accordance with Braun (2017), and Index fungorum (www.indexfungorum.org: accessed 1 March 2020),



current names of the host plant taxa were confirmed according to the plant list (www. theplantlist.org). Identification of the fungal samples was performed according to Braun and Cook (2012).

## Results

### Fungi

#### Ascomycota

#### Leotiomyces

#### Erysiphales

#### Erysiphaceae

**Blumeria graminis** (DC.) Speer: On *Avena barbata* Pottex ex Link (*Poaceae*), Adana: Akçatekir plateau, 920-1000 m, 22.05.2014, Ş. Kabaktepe 7510; On *Bromus sterilis* L. (*Poaceae*), Niğde: Çamardı, Emlivalley, 1800-1900 m, 25.06.2015, Ş. Kabaktepe 8122; Kayseri: Yahyalı, Kirazlıbağ village, 1250-1400 m, 25.09.2013, Ş. Kabaktepe 7152; On *Elymus hispidus* (Opiz) Melderis (*Poaceae*), Konya: Halkapınar, 5 km from Kayasaray to Çakıllar, 1350-1400 m, 14.07.2014, Ş. Kabaktepe 7565; On *Festuca cappadocica* (Hack.) Markgr.-Dann. (*Poaceae*), Mersin: Between Gülek to Çamlıyayla, Kurt çukuru area, 550-600 m, 26.06.2015, Ş. Kabaktepe 8161; On *Hordeum bulbosum* L. (*Poaceae*), Adana: Aladağ, 600-650 m., 23.04.2014, Ş. Kabaktepe 7375; On *Milium effusum* L. (*Poaceae*), Kayseri: Yahyalı, Hacer forest, Yedigöller, 2000-2100 m, 24.06.2015, Ş. Kabaktepe 8101; On *Phleum pratense* L. (*Poaceae*), Niğde: Çamardı, Emlı valley, 1800-1900 m, 25.06.2015, Ş. Kabaktepe 8120; On *Secale cereale* L. (*Poaceae*), Kayseri: Yahyalı, 3-5 km from Ulupınar to Aksu valley, 1100 m, 21.05.2014, Ş. Kabaktepe 7454; On *Triticum aestivum* L. (*Poaceae*), Kayseri: Yahyalı, 3-5 km from Ulupınar to Aksu valley, 1100 m, 21.05.2014, Ş. Kabaktepe 7463; Kayseri, Yahyalı, 2 km from Çamlıca to Ulupınar, 1050 m, 21.05.2014, Ş. Kabaktepe 7471; Mersin: Toroslar, 5 km from Değnek to Tırtar, 1400 m, 23.05.2014, Ş. Kabaktepe 7512.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe alphitoides** (Griffon & Maubl.) U. Braun & S. Takam.: On *Quercus cerris* L. (*Fagaceae*), Adana: Aladağ, 22. km from Gerdibi to Kamlı, 980 m, 18.09.2014, Ş. Kabaktepe 7815; Niğde, Ulukışla, 10. km from Kılan to Darboğaz, 1500-1550 m, 29.08.2015, Ş. Kabaktepe 8284; Kayseri: Yahyalı, Derebağ waterfall, 1330 m, 17.09.2014, Ş. Kabaktepe 7778; On *Quercus coccifera* L. (*Fagaceae*), Konya: Halkapınar, Yassıkaya village, 1460 m, 31.10.2014, Ş. Kabaktepe 7939; Kayseri: Yahyalı, 18. km from Kapuzbaşı to Aladağ, Pos jungle, 920 m, 18.09.2014, Ş. Kabaktepe 7795; On *Quercus infectoria* Olivier (*Fagaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7896; Mersin: Çamlıyayla, İnköy village, 850-900 m, 31.10.2014, Ş. Kabaktepe 7948; Mersin: Çamlıyayla, 2. km from Sebil to Cehennem River, 1100-1150 m, 01.11.2014, Ş. Kabaktepe 7963; Mersin: Çamlıyayla, Sebil, Cehennem river, Bağdut area, 900-960 m, 01.11.2014, Ş. Kabaktepe 7971; Mersin: Çamlıyayla,

Sinap Castle, 1100-1200 m, 26.08.2015, Ş. Kabaktepe 8202; On *Quercus pubescens* Willd. (*Fagaceae*), Kayseri, Yahyalı, Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8338.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe aquilegiae** DC.: On *Ranunculus* sp. (*Ranunculaceae*), Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7823.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe astragali** DC.: On *Astragalus* sp. (*Fabaceae*), Kayseri: Yahyalı, Derebağ Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8333.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe atraphaxis** (Golovin) U. Braun & S. Takam.: On *Atraphaxis billardieri* Jaub. & Spach (*Polygonaceae*), Mersin: Çamlıyayla, Sebil, Cehennem River, Bağdut area, 900-960 m, 01.11.2014, Ş. Kabaktepe 7974.

Distribution: China, Mongolia (Braun and Cook, 2012).

**Erysiphe berberidis** DC.: *Berberis crataegina* DC. (*Berberidaceae*), Niğde: Çamardı, Demirkazık, Cımar throat, 1600-1750 m, 30.10.2014, Ş. Kabaktepe 7909; Kayseri: Yahyalı, 5. km from Ulupınar to Hacer foest, 1450 m, 24.06.2015, Ş. Kabaktepe 8189.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe buhrii** U. Braun: On *Arenaria rotundifolia* M. Bieb. (*Caryophyllaceae*), Niğde, Çamardı, Emlı valley, 1900-2200 m, 16.10.2015, Ş. Kabaktepe 8434; On *Minuartia juniperina* (L.) Maire & Petitm. (*Caryophyllaceae*), Mersin: Çamlıyayla, Saydibi plateau, 1860 m, 09.10.2013, Ş. Kabaktepe 7355.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe caulicola** (Petr.) U. Braun: On *Astragalus* sp. (*Fabaceae*), Niğde: Ulukışla, 10 km from Kılan to Darboğaz, 1500-1550 m, 29.08.2015, Ş. Kabaktepe 8283.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe coluteae** (Kom.) U. Braun & S. Takam.: On *Colutea cilicica* Boiss. & Balansa (*Fabaceae*), Konya: Halkapınar, İvriz dam lake, 1080-1130 m, 28.08.2015, Ş. Kabaktepe 8263.

Distribution: Cosmopolitan in Asia (Braun and Cook, 2012).

**Erysiphe convolvuli** DC.: On *Convolvulus arvensis* L. (*Convolvulaceae*), Kayseri: 30. km from Develi to Yahyalı, 1030 m, 05.10.2013, Ş. Kabaktepe 7258; Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7829; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8380.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe cruciferarum** Opiz ex L. Junell: On *Alyssum strigosum* Banks & Sol. (*Brassicaceae*), Adana: Aladağ, Gerdibi village, 27.09.2013, Ş. Kabaktepe 7238; Kayseri, Yahyalı, 3-5 km from Ulupınar to Aksu valley, 1100 m, 21.05.2014, Ş. Kabaktepe 7451; Kayseri: Yahyalı, Derebağ waterfall, 1400-1600 m, 23.06.2015, Ş. Kabaktepe 8072; Kayseri, Yahyalı, Derebağ Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8336.

Distribution: Cosmopolitan (Braun and Cook, 2012).



**Erysiphe flexuosa** (Peck) U. Braun & S. Takam.: On *Aesculus hippocastanum* L. (*Sapindaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1330 m, 17.09.2014, Ş. Kabaktepe 7775.

Distribution: Cosmopolitan in Europe, Canada, USA (Braun and Cook, 2012).

**Erysiphe geraniacearum** U. Braun & Simonyan: On *Geranium tuberosum* L. (*Geraniaceae*), Adana: Pozanti, Horoz village, 1200-1250 m, 15.07.2014, Ş. Kabaktepe 7616.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe guarinonii** (Briosi & Cavara) U. Braun & S. Takam.: On *Laburnum anagyroides* Medik. (*Fabaceae*), Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8324.

Distribution: Australia, Germany, Denmark, United Kingdom, Switzerland, Italy, Poland (Braun and Cook, 2012).

**Erysiphe heraclei** DC.: On *Seseli libanotis* Koch (*Apiaceae*), Mersin: Toroslar, 3 km from Aslanköy to Fındıkpınarı, 20.09.2014, Ş. Kabaktepe 7873; Adana: 8 km from Mansurlu to Yahyalı, 1450-1500 m, 25.08.2015, Ş. Kabaktepe 8180; Kayseri, Yahyalı, Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8337; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8372; On *Torilis arvensis* (Huds.) Link (*Apiaceae*), Kayseri: Yahyalı, Ulupınar, 1800-2000 m, 16.07.2014, Ş. Kabaktepe 7637.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe knautiae** Duby: On *Morina persica* L. (*Morinaceae*), Niğde: Çamardı, Demirkazık village, Cimbar throat, 1650-1800 m, 15.07.2014, Ş. Kabaktepe 7587; Niğde: Çamardı, Demirkazık, Cimbar throat, 1600-1750 m, 30.10.2014, Ş. Kabaktepe 7911.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe lycopsidis** R.Y. Zheng & G.Q. Chen: On *Anchusa leptophylla* Roem. & Schult. (*Boraginaceae*), Kayseri, Yahyalı, 3-5 km from Ulupınar to Aksu valley, 1100 m, 21.05.2014, Ş. Kabaktepe 7457; Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7893; Kayseri: Yahyalı, Ulupınar, Hacer forest, 1450 m, 24.06.2015, Ş. Kabaktepe 8109; Kayseri, 18 km from Develi to Yahyalı, 1000-1050 m, 14.10.2015, Ş. Kabaktepe 8315; On *Cynoglossum montanum* L. (*Boraginaceae*) Mersin: Toroslar, Atlılar village, 1250 m, 27.06.2015, Ş. Kabaktepe 8170.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe mayorii** S. Blumer: On *Cirsium vulgare* (Savi) Ten. (*Asteraceae*), Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8369.

Distribution: Cosmopolitan in Europe, Iran (Braun and Cook, 2012).

**Erysiphe necator** Schwein.: On *Vitis vinifera* L. (*Vitaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1250 m, 05.10.2013, Ş. Kabaktepe 7276; Mersin: Çamlıyayla, Sebil, Cehennem River, 1100-1150 m, 01.11.2014, Ş. Kabaktepe 7956; Kayseri, 18 km from Develi to Yahyalı, 1000-1050 m, 14.10.2015, Ş. Kabaktepe 8321; Konya, 3

km from Ereğli to Halkapınar, 950 m, 15.10.2015, Ş. Kabaktepe 8398.

Distribution: Cosmopolitan in Europe, Iran (Braun and Cook, 2012).

**Erysiphe pisi** DC: On *Consolida orientalis* (J. Gay.) Schrödinger (*Fabaceae*), Kayseri, Yahyalı, 3-5 km from Ulupınar to Aksu valley, 1100 m, 21.05.2014, Ş. Kabaktepe 7459; Adana: Pozanti, Dağdibi village, 27.09.2013, Ş. Kabaktepe 7230; On *Medicago x varia* Martyn (*Fabaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7886; Kayseri: Yahyalı, Kirazlıbağ village, 1250-1400 m, 25.09.2013, Ş. Kabaktepe 7154; Konya, 3 km from Ereğli to Halkapınar, 950 m, 15.10.2015, Ş. Kabaktepe 8400; On *Vicia cracca* L. (*Fabaceae*) Mersin, Çamlıyayla, Kadıncık valley, Kuzbağı area, 1350-1450 m, 17.10.2015, Ş. Kabaktepe 8479.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe platani** (Howe) U. Braun & S. Takam.: On *Platanus orientalis* L. (*Platanaceae*), Kayseri, Yahyalı, Derebağ waterfall, 1270 m, 17.09.2014, Ş. Kabaktepe 7768; On *Platanus orientalis* L. (*Platanaceae*), Kayseri: Yahyalı, Kapuzbaşı, 650-700 m, 18.09.2014, Ş. Kabaktepe 7791.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe polygoni** DC.: On *Polygonum bistorta* L. (*Polygonaceae*), Kayseri: Yahyalı, Kirazlıbağ village, 1150-1200 m, 14.10.2015, Ş. Kabaktepe 8357; Adana: Pozanti, Horoz village, 1300-1350 m, 15.07.2014, Ş. Kabaktepe 7591; On *Rumex patientia* L. (*Polygonaceae*), Niğde, Ulukışla, Kılan, Eskiköy area, 1680-1750 m, 29.08.2015, Ş. Kabaktepe 8295.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Erysiphe thesii** L. Junell: On *Thesium arvense* Horv. (*Santalaceae*), Niğde, Ulukışla, 14 km from Kılan to Darboğaz, 1600-1650 m, 29.08.2015, Ş. Kabaktepe 8289.

Distribution: Cosmopolitan in Europe (Braun and Cook, 2012).

**Erysiphe tortilis** (Wallr.) Link: On *Cornus sanguinea* L. (*Cornaceae*), Konya: Halkapınar, İvriz dam lake, 1080-1130 m, 28.08.2015, Ş. Kabaktepe 8262.

Distribution: Armenia, Georgia, Iran, Cosmopolitan in Europe (Braun and Cook, 2012).

**Erysiphe urticae** (Wallr.) S. Blumer: On *Urtica dioica* L. (*Urticaceae*), Mersin: Çamlıyayla, Saydibi plateau, 1800-1880 m, 09.10.2013, Ş. Kabaktepe 7356.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Golovinomyces biocellatus** (Ehrenb.) V.P. Heluta: On *Ajuga salicifolia* (L.) Schreb. (*Lamiaceae*), Niğde: Çamardı, Demirkazık village, Cimbar throat, 1650-1800 m, 15.07.2014, Ş. Kabaktepe 7580; On *Nepeta nuda* L. (*Lamiaceae*), Konya, Halkapınar, Yassıkaya village, 1850 m, 14.07.2014, Ş. Kabaktepe 7557.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Golovinomyces cichoracearum** (DC.) V.P. Heluta: On *Achillea arabica* Kotschy (*Asteraceae*), Mersin: Çamlıyayla, Sebil – Cehennem River, 1400 m,





27.06.2015, Ş. Kabaktepe 8162; On *Crepis foetida* L. (*Asteraceae*), Konya: Halkapınar, 5 km from Kayasaray to Çakıllar, 1350-1400 m, 14.07.2014, Ş. Kabaktepe 7558b; On *Inula aucheriana* DC. (*Asteraceae*), Mersin: Tarsus, Söğütlü village, 575 m, 08.10.2013, Ş. Kabaktepe 7332b; Niğde: Çamardı, Demirkazık village, Cımbar, 1650-1800 m, 15.07.2014, Ş. Kabaktepe 7588; On *Lactuca tuberosa* Jacq. (*Asteraceae*), Konya: Halkapınar, Kayasaray village, 1650-1750 m, 13.07.2014, Ş. Kabaktepe 7542; On *Taraxacum* sp. (*Asteraceae*), Konya: Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8397.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces cucurbitacearum*** (R.Y. Zheng & G.Q. Chen) Vokal. & Kliron.: On *Cucurbita pepo* L. (*Cucurbitaceae*), Adana: 8 km from Mansurlu to Yahyalı, 1450-1500 m, 25.08.2015, Ş. Kabaktepe 8179; Kayseri: 6 km from Yahyalı to Kirazlıbağ, 1250-1400 m, 14.10.2015, Ş. Kabaktepe 8348.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces cynoglossi*** (Wallr.) V.P. Heluta: On *Anchusa leptophylla* Roem. & Schult. (*Boraginaceae*), Konya, 18 km from Ereğli to İvriz, 1100 m, 15.10.2015, Ş. Kabaktepe 8364; On *Cerintho minor* L. (*Boraginaceae*) Konya: Halkapınar, Kayasaray village, 1650-1750 m, 13.07.2014, Ş. Kabaktepe 7542.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces depressus*** (Wallr.) V.P. Heluta: On *Arctium minus* (Hill) Bernh. (*Asteraceae*), Adana: Pozantı, Horoz Throat, 950-1000 m, 30.10.2014, Ş. Kabaktepe 7917.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces orontii*** (Castagne) V.P. Heluta: On *Acanthus dioscoridis* L. (*Acanthaceae*), Konya, Halkapınar, Kayasaray village, 1650-1750 m, 13.07.2014, Ş. Kabaktepe 7548; On *Helianthus annuus* L. (*Asteraceae*), Adana: 8 km from Mansurlu to Yahyalı, 1450-1500 m, 25.08.2015, Ş. Kabaktepe 8177.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces sordidus*** (L. Junell) V.P. Heluta: On *Plantago major* L. (*Plantaginaceae*), Niğde: Çamardı, Demirkazık, Cımbar Throat, 1600-1750 m, 30.10.2014, Ş. Kabaktepe 7906.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Golovinomyces valerianae*** (Jacq.) V.P. Heluta: On *Centranthus longiflorus* Steven (*Caprifoliaceae*), Niğde: Çamardı, Demirkazık, Cımbar Throat, 1600-1750 m, 30.10.2014, Ş. Kabaktepe 7910; Kayseri, Yahyalı, Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8328; On *Valeriana dioscoridis* Sm. (*Caprifoliaceae*) Adana: 5 km from Pozantı to Ömerli, 850 m, 20.05.2014, Ş. Kabaktepe 7444.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Leveillula chrozophorae*** U. Braun: On *Chrozophora tinctoria* (L.) A. Juss. (*Euphorbiaceae*), Kayseri, Yahyalı, Çamlıca village, 1050-1100m, 16.07.2014, Ş. Kabaktepe 7654.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Leveillula duriae*** (Lév.) U. Braun: On *Phlomis pungens* Willd. (*Lamiaceae*), Niğde: Ulukışla, 3-4 km from Darboğaz to Yazıgölü plateau, 1550 m, 19.09.2014, Ş. Kabaktepe 7839; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8375; On *Stachys sparsipilosa* R.Bhattacharjee & Hub.-Mor. (*Lamiaceae*), Mersin: Çamlıyayla, Olukkaya village, 990 m, 22.05.2014, Ş. Kabaktepe 7487; Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7822; On *Teucrium chamaedrys* L. (*Lamiaceae*), Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8388.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Leveillula geraniacearum*** Eliade ex U. Braun: On *Geranium tuberosum* L. (*Geraniaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7890.

Distribution: Bulgaria, France, Georgia, Romania, Serbia (Braun and Cook, 2012).

***Leveillula lactucarum*** Durrieu & Rostam: On *Chondrilla juncea* L. (*Asteraceae*), Kayseri: 30 km from Develi to Yahyalı, 1030 m, 05.10.2013, Ş. Kabaktepe 7255; Mersin: Tarsus, Gülek village, 1240 m, 08.10.2013, Ş. Kabaktepe 7320; Kayseri, 18 km from Develi to Yahyalı, 1000-1050 m, 14.10.2015, Ş. Kabaktepe 8313; Konya: Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8386; On *Lactuca sativa* L. (*Asteraceae*), Adana, Pozantı, Karanfil mountain, 1150-1200 m, 16.10.2015, Ş. Kabaktepe 8453; Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7822.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Leveillula lappae*** (Castagne) U. Braun: On *Centaurea virgata* Lam. (*Asteraceae*), Kayseri, Yahyalı, Derebağ waterfall, 1270 m, 17.09.2014, Ş. Kabaktepe 7770; Çamardı, Demirkazık, Yarpuz II area, 2300-2400 m, 25.06.2015, Ş. Kabaktepe 8116; Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7825; Mersin: Çamlıyayla, Sebil, Cehennem River, Suçatı area, 1800-2000 m, 27.06.2015, Ş. Kabaktepe 8165; On *Cirsium arvense* (L.) Scop. (*Asteraceae*), Niğde, Ulukışla, 15-20 km from Darboğaz to Yassıkaya, 1550-1600 m, 15.10.2015, Ş. Kabaktepe 8422; On *Crepis foetida* L. (*Asteraceae*), Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8381.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Leveillula papilionacearum*** (Kom.) U. Braun: On *Astragalus* sp. (*Fabaceae*), Konya: Halkapınar, İvriz village 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8392; On *Coronilla varia* L. (*Fabaceae*), Adana: 8 km from Aladağ to Mansurlu, 960 m, 20.05.2015, Ş. Kabaktepe 8046; On *Lathyrus pratensis* L. (*Fabaceae*), Kayseri: Yahyalı, Kapuzbaşı, 650-700 m, 18.09.2014, Ş. Kabaktepe 7790; On *Medicago sativa* L. (*Fabaceae*), Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7821; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8387; On *Ononis spinosa* L. (*Fabaceae*), Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7824; On *Vicia villosa* Roth



(*Fabaceae*), Adana: Aladağ, 600-650 m, 23.04.2014, Ş. Kabaktepe 7374; Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7818; Konya, 18km from Ereğli to İvriz, 1100 m, 15.10.2015, Ş. Kabaktepe 8360; Konya, Halkapınar, Çakıllar village, Aydos mountain, 1350-1400 m, 15.10.2015, Ş. Kabaktepe 8407; Niğde, Ulukışla, Darboğaz village, 1550-1600 m, 15.10.2015, Ş. Kabaktepe 8424.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Leveillula picridis** (Castagne) Durrieu & Rostam: On *Centaurea kotschyi* (Boiss. & Heldr.) Hayek (*Asteraceae*), Niğde, Ulukışla, Darboğaz village, 1550-1600 m, 15.10.2015, Ş. Kabaktepe 8415; On *Echinops ritro* L. (*Asteraceae*), Konya: Halkapınar, Yassıkaya villge, 1460 m, 31.10.2014, Ş. Kabaktepe 7942; On *Picris hieracioides* L. (*Asteraceae*), Niğde, Çamardı, Elek village, 27.09.2013, Ş. Kabaktepe 7222.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Leveillula taurica** (Lév.) G. Arnaud: On *Glaucium grandiflorum* Boiss. & A. Huet (*Papaveraceae*), Konya: Halkapınar, Kayasaray village, 1650-1750 m, 13.07.2014, Ş. Kabaktepe 7543; Kayseri, Yahyalı, Derebağ waterfall, 14.10.2015, Ş. Kabaktepe 8332; On *Papaver rhoeas* L. (*Papaveraceae*), Adana: Pozantı, Ömerli village, 1100-1150 m, 15.07.2014, Ş. Kabaktepe 7601; On *Peganum harmala* L. (*Zygophyllaceae*), Kayseri: Yahyalı, Çubuklu village, 26.09.2013, Ş. Kabaktepe 7179; On *Scabiosa argentea* L. (*Dipsecaceae*), Niğde, Çamardı, Emli valley, 1900-2200 m, 16.10.2015, Ş. Kabaktepe 8433.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Leveillula verbasci** (Jacq.) Golovin: On *Verbascum* sp. (*Scrophulariaceae*), Niğde, Ulukışla, 10 km from Kılan to Darboğaz, 1500-1550 m, 29.08.2015, Ş. Kabaktepe 8286.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Neoerysiphe galeopsidis** (DC.) U. Braun: On *Sideritis libanotica* Labill. (*Lamiaceae*), Mersin: Çamlıyayla, Kadıncık valley, 1850-1900 m, 18.07.2014, Ş. Kabaktepe 7691; *Marrubium vulgare* L. (*Lamiaceae*), Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7826; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8384; On *Stachys sparsipilosa* R. Bhattacharjee & Hub.-Mor. (*Lamiaceae*), Kayseri: Yahyalı, Ulupınar, Yedigöller area, 1800-2000 m, 16.07.2014, Ş. Kabaktepe 7633.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Neoerysiphe galii** (S. Blumer) U. Braun: On *Galium verum* L. (*Rubiaceae*), Niğde, Çamardı, Demirkazık village, 1850-2000 m, 26.09.2013, Ş. Kabaktepe 7213; Kayseri: Yahyalı, Kayapınar plateau, 1600-1650 m, 23.06.2015, Ş. Kabaktepe 8081.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia corni** H.D. Shin & M.J. Park: On *Cornus mas* L. (*Cornaceae*), Mersin: Çamlıyayla, Sebil, Cehennem River, 1100-1150 m, 01.11.2014, Ş. Kabaktepe 7962.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia fraxini** (DC.) Fuss: On *Fraxinus angustifolia* Vahl (*Oleaceae*), Mersin: Mezitli, Tepeköy village, 1140 m, 20.09.2014, Ş. Kabaktepe 7883; Mersin: Çamlıyayla, Sebil, Cehennem River, 1100-1150 m, 01.11.2014, Ş. Kabaktepe 7961.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia guttata** (Wallr.) Lév.: On *Corylus avellana* L. (*Betulaceae*), Konya, 18 km from Ereğli to İvriz, 1100 m, 15.10.2015, Ş. Kabaktepe 8365.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia mali** (Duby) U. Braun: On *Crataegus monogyna* Jacq. (*Rosaceae*), Kayseri: 30 km from Develi to Yahyalı, 1030 m, 05.10.2013, Ş. Kabaktepe 7263; Mersin, Tarsus, Gülek throat, 1020-1100 m, 08.10.2013, Ş. Kabaktepe 7322; Mersin: Tarsus, Söğütlü village, 575 m, 08.10.2013, Ş. Kabaktepe 7333; Adana: Aladağ, 7 km from Kökez to Gerdibi, 1020 m, 18.09.2014, Ş. Kabaktepe 7799.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia nivea** (Castagne) U. Braun: On *Ulmus glabra* Huds. (*Ulmaceae*), Kayseri: Aladaglar National Park, Ulupınar village, 1080 m, 07.10.2013, Ş. Kabaktepe 7291; On *Crataegus monogyna* Jacq. (*Rosaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7888; Mersin: Çamlıyayla, Sebil, Cehennem River, 1100-1150 m, 01.11.2014, Ş. Kabaktepe 7960.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia paliuri** U. Braun: On *Paliurus spina-christi* P. Mill. (*Rhamnaceae*), Kayseri: Yahyalı, Aladaglar National Park, Ulupınar village, 900-950 m, 07.10.2013, Ş. Kabaktepe 7281; Mersin: Toroslar, 4 km from Tirtar to Aslanköy, 1350 m, 20.09.2014, Ş. Kabaktepe 7864; Adana: Pozantı, Horoz throat, 950-1000 m, 30.10.2014, Ş. Kabaktepe 7919.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Phyllactinia pistaciae** H.D. Shin & Y.J. Choi: On *Pistacia terebinthus* L. (*Anacardiaceae*), Adana: Pozantı, Horoz throat, 950-1000 m, 30.10.2014, Ş. Kabaktepe 7923.

Distribution: Iran, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Greece (Braun and Cook, 2012).

**Phyllactinia pyri-serotinae** Sawada: On *Cotoneaster nummularia* Fisch. & C.A. Mey. (*Rosaceae*), Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7889; Adana: Aladağ, Gerdibi village, 975 m, 18.09.2014, Ş. Kabaktepe 7803; Kayseri: Yahyalı, Ulupınar village, Aksu valley, 1050-1100 m, 25.08.2015, Ş. Kabaktepe 8187; On *Crataegus monogyna* Jacq. (*Rosaceae*), Konya: Halkapınar, Yassıkaya village, 1800-1850 m, 29.08.2015, Ş. Kabaktepe 8379; Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 29.10.2014, Ş. Kabaktepe 7891; On *Crataegus szovitsii* Pojark., Kayseri: Yahyalı, Derebağ waterfall, 1350-1450 m, 14.10.2015, Ş. Kabaktepe 8341; Mersin: Tarsus, Gülek, Karboğazi, 1750-1850 m, 16.10.2015, Ş. Kabaktepe 8462.

Distribution: Cosmopolitan (Braun and Cook, 2012).

**Podosphaera aphanis** (Wallr.) U. Braun & S. Takam.: On *Alchemilla holocycla* Rothm. (*Rosaceae*), Niğde:





Dündarlı, 1600 m, 30.10.2014, Ş. Kabaktepe 7895. On *Potentilla recta* L. (*Rosaceae*), Kayseri: Yahyalı, Aladaglar National Park, Hacer forest, 1550-1600 m, 07.10.2013, Ş. Kabaktepe 7300.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera dipsacacearum*** (Tul. & C. Tul.) U. Braun & S. Takam.: On *Scabiosa argentea* L. (*Dipsacaceae*), Mersin: Toroslar, 4 km from Tirtar to Aslanköy, 1350 m, 20.09.2014, Ş. Kabaktepe 7864.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera ferruginea*** (Schltl.) U. Braun & S. Takam.: On *Sanguisorba minor* L. (*Rosaceae*), Mersin: Tarsus, Söğütlü village, 575 m, 08.10.2013, Ş. Kabaktepe 7332; Konya, Halkapınar, İvriz village, 1200-1300 m, 15.10.2015, Ş. Kabaktepe 8371.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera fusca*** (Fr.) U. Braun & Shishkoff: On *Xanthium strumarium* L. (*Asteraceae*), Mersin: Tarsus, Söğütlü village, 575 m, 08.10.2013, Ş. Kabaktepe 7336.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera pannosa*** (Wallr.) de Bary: On *Prunus domestica* L. (*Rosaceae*), Mersin: Çamlıyayla, 7 km from Fakılar to Kadıncık valley, 1200-1300 m, 18.07.2014, Ş. Kabaktepe 7732; On *Rosa canina* L. (*Rosaceae*), Niğde:

Ulukışla, 3-4 km from Darboğaz to Yazıgülü plateau, 1550 m, 19.09.2014, Ş. Kabaktepe 7843.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera plantaginis*** (Castagne) U. Braun & S. Takam.: On *Plantago major* L. (*Plantaginaceae*), Niğde: Ulukışla, Emirler village, 1440-1460 m, 19.09.2014, Ş. Kabaktepe 7835.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Podosphaera tridactyla*** (Wallr.) de Bary: On *Ceracus incana* var. *incana* (Pall.) Spach (*Rosaceae*), Kayseri: Yahyalı, Aladaglar National Park, Hacer forest, 950-1000 m, 24.06.2015, Ş. Kabaktepe 8085.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Sawadaea bicornis*** (Wallr.) Homma: On *Acer monspessulanum* L. (*Sapindaceae*), Karaman: 2-3 km from Ayrancı to Çat, 1050-1100 m, 28.08.2015, Ş. Kabaktepe 8254.

Distribution: Cosmopolitan (Braun and Cook, 2012).

***Sawadaea tulasnei*** (Fuckel) Homma. On *Acer monspessulanum* L. (*Sapindaceae*), Niğde: Çamardı, Demirkazık village 1850-2000 m, 26.09.2013, Ş. Kabaktepe & I. Akata 7218.

Distribution: Cosmopolitan in Europe, China, Iran, Japan, Korea, Russia (Braun and Cook, 2012).



**Figure 1.** *Sawadaea tulasnei* on *Acer monspessulanum*: **a.**, the host plant affected by the powdery mildews **b.**, chasmothecia as viewed under the light microscope **c.** a single ascus -**d.** ascospores.



### Discussions

As a result, Sixty-one powdery mildews species of eight genera and one family were listed. The samples belonging to Sixty-one powdery mildews were observed on 94 host species within the 83 genera and 37 families.

The species numbers of genera are as follows; *Erysiphe* 24, *Leveillula* 9, *Golovinomyces* 8, *Phyllactinia* 8 and *Podosphaera* 7, *Neoerysiphe* 2, *Sawadaea* 2, and *Blumeria* 1.

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With the current study, we make a contribution of Turkey mycobiota and the number of Turkish powdery mildew species are 144.

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