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COELOMYCETOUS FUNGI IN SEVERAL FOREST ECOSYSTEMS OF BLACK SEA PROVINCES OF TURKEY

SUMMARY

As a result of the study made in this area forty-six Coelomycetes species have been identified. These species belong to 37 genera, 20 families, 9 orders and 4 classis (Dothideomycetes class: 3 orders, 6 families, 11 genera and 19 species; Leotiomycetes: 2, 3, 7 and 7; Sordariomycetes: 3, 10, 14 and 16; Incertae sedis: 1, 1, 4 and 4 respectively) of Ascomycota. From determinerd 46Coelomycetous species only 14 (30.4%) are linked to their sexual stage, 8 (17.4%) are linked to a family and 2 (4.3%) are linked to an order. Five (10.9%) species are linked to subdivision (Pezizomycotina) and 18 (39.1%) to a genera of teleomorphic fungi. Among collected Coelomycetous fungi different types of conidiomata have been registered: pycnidial (17 species), acervular (17), stromatic (9), pseudostromatic (2) and pycnothyrial (1).

Keywords: Coelomycetes, fungi, forest ecosystems, Black Sea.

INTRODUCTION

Coelomycetes are widespread saprobic or parasitic fungi on higher plants, fungi, lichens, vertebrates, also recovered from the widest range of ecological niches. These fungi comprise more than 1000 genera and 7000 species in the world (Kirk *et al.*, 2008).Coelomycetes is a general term for asexual forms (previously named anamorphs) of Ascomycota and Basidiomycota which produce conidia within fruiting bodies called conidiomata (Gehlot *et al.*, 2010; Wijayawardene *et al.*, 2012). The conidiomata can be pycnidial, pycnothyrial, acervular, cupulate, stromatic (Kirk *et al.*, 2008) or pseudostromatic (Sutton, 1980) and several intermediate forms between pycnidia and acervuli (Nag Raj, 1993).

Coelomycetes in Turkey are not well understood, although a wide range of host plants (more than 10.000 vascular plant species) and a variety of environmental conditions are favorable for their development and distribution.

Research related to the Coelomycetous fungi began with Bremer *et al.* and Bremer and Petrak (Bremer and Petrak 1947; Bremer *et al.* 1948, 1952a, 1952b). These studies were followed by studies of Petrak, Karel, Lohwag and Göbelez (Petrak, 1953, 1957; Karel, 1958; Lohwag, 1963; Göbelez, 1964). Single fragmentary data about the Coelomycetes we find in the works of Öner *et al.* (1984), Tamer *et al.* (1987, 1989, 1990), Güven and Tamer (1993), Demirci *et al.*

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(1998) and Kırbağ (2004). Studies about Coelomycetous fungi in Turkey were intensified since 2000 year (Hüseyinov, 2000; Hüseyinov and Selçuk 2000, 2001; Hüseyin and Selçuk 2000, 2001a, 2001b, 2002a, 2002b; Selçuk and Hüseyin 2000, 2001, 2005, 2012; Akgül *et al.* 2002, 2012a, 2012b, 2012c; Selçuk *et al.* 2002, 2003, 2004, 2009, 2010a, 2010b, 2012a, 2012b, 2012c; Hüseyin, 2004; Hüseyin *et al.* 2004, 2005a, 2005b, 2005c, 2006, 2007, 2009, 2011, 2012a, 2012b, 2012c; Hüseyin and Yıldızbaş 2005; Mel'nik *et al.* 2004; Hüseyin and Erdoğan 2006, 2008; Erdoğan and Hüseyin 2008a, 2008b, 2009, 2011, 2012; Erdoğan *et al.* 2007, 2010a, 2010b, 2012; Göçmen *et al.* 2011, 2012).

The aimed studies of Coelomycetes in Black Sea coast were started by us (Hüseyinov and Selçuk, 2000, 2001; Hüseyin and Selçuk, 2000; Selçuk and Hüseyin, 2000, 2005; Mel'nik *et al.*, 2004; Selçuk *et al.*, 2004). This study was carried out in several provinces of Middle and East part of Black Sea coast forest ecosystems of Turkey same as Samsun, Giresun, Ordu, Trabzon and Rize.

MATERIAL AND METHODS

The materials for the present study were collected in 1998-2001 during special field trips in Samsun, Giresun, Ordu, Trabzon and Rize provinces. Specimens of the fungi were taken to the laboratory and examined under a Leica DM 3000 compound microscope. Sections were hand cut using a razor blade. The fungi were identified using the relevant literature (Grove, 1935, 1937; Vassiljevsky and Karakulin, 1950; Merezko, 1980; Sutton, 1980; Teterevnikova-Babayan *et al.* 1983; Ellis and Ellis, 1987; Mel'nik and Popushoy, 1992; Nag Raj, 1993; Ignatavičiūtė and Traigienė 1998; Mel'nik, 2000; Gehlot *et al.* 2010). Host plants were identified using the "Flora of Turkey and East Aegean Islands" (Davis 1965-1985). Taxa, family, and author citations were listed according to Cannon and Kirk (2007), Kirk *et al.* (2008), Index Fungorum (www.indexfungorum.org, accessed 2014). Family and species names are listed in alphabetical order in text according to their systematic position. All specimens are deposited in the Mycological Collection of the Arts and Sciences Faculty of Ahi Evran University (AhEUM), Kırşehir, Turkey.

Abbreviations: FS: Collection number of Faruk Selçuk; GP: Giresun Province; OP: Ordu Province; RP: Rize Province; SP: Samsun Province; TP: Trabzon Province.

RESULTS AND DISCUSSION

As a result of the study made in this area more than 120 species of microfungi have been identified.. Among these identified microfungi forty-six species are represented by Coelomycetes. The species belong to 37 genera, 20 families, 9 orders and 4 classis (Dothideomycetes class: 3 orders, 6 families, 11 genera and 19 species; Leotiomycetes: 2, 3, 7 and 7; Sordariomycetes: 3, 10, 14 and 16; Incertae sedis: 1, 1, 4 and 4 respectively) of Ascomycota. The following is list of species.

Kingdom Fungi
 Division Ascomycota
 Class Dothideomycetes
 Order Botryosphaerales
 Family Botryosphaeriaceae

Diplodia buxicola Sacc. (Anamorphic Botryosphaeriaceae)– on branches of *Buxus sempervirens* L. (Buxaceae). RP, Çamlıhemşin district, Fırtına river, near Tozkaban, 930 m a.s.l., 24.09.2001. (FS. 0514).

Dothiorella candollei (Berl. & Broome) Petr. (Anamorphic Botryosphaeriaceae) – on dead branches of *Buxus sempervirens* L. (Buxaceae).RP, Çamlıhemşin district, Fırtına river, near Tozkapan, 930 m a.s.l., 24.09.2001. (FS. 0511).

Macrophoma oleandri Pass. (Anamorphic Botryosphaeriaceae) – on living leaves of *Nerium oleander* L. (Apocynaceae). RP, Ziraat botanic garden, 110 m a.s.l., 26.09.2001. (FS. 0655).

Phyllosticta alni-glutinosae P. Syd. (AnamorphicGuignardia)– on living leaves of *Alnus glutinosa* (L.) Gaertnerssp. *glutinosa* (Betulaceae).RP, Çamlıhemşin district, Center, 710 m a.s.l., 31. 07.1999. ((FS. 0290).

Ph. auerswaldii Allesch. (Anamorphic Guignardia)–on living leaves of *Buxus sempervirens*L. (Buxaceae). RP, Çamlıhemşin district, near Tozkaban,1040 m a.s.l., 28.07.1998. (FS. 0159).

Ph. berberidis Rabenh. (Anamorphic Guignardia) – on living leaves of *Berberis crataegina* DC.(Berberidaceae).RP, Çamlıhemşin district, Kale village 1750 m a. s. l.,24.09.2001. (FS. 0531).

Ph. concentrica Sacc. (Anamorphic Guignardia) – on living leaves of *Hedera helix*L. (Araliaceae).RP, Çamlıhemşin district, Fırtına river, near Tozkaban, 930 m a. s. l.,24.09.2001. (FS. 0543).

Sphaeropsis sapinea (Fr.) Dyko & B. Sutton (Anamorphic Pezizomycotina) – on bark of felled trunks of *Pinus nigra* Arn. ssp. *pallasiana* (Lamb.) Holmboe (Pinaceae). SP, Söğüt village, near Ada, 40 m a. s. l.,28.09.2001. (FS. 0628).

Family Incertae sedis

Camarosporium varium (Pers.) Starb. – on wood of *Prunus laurocerasus* L.(Rosaceae). RP, Ardeşen district, around Gültekinler neighbourhood, 210 m a. s. l., 25.10.2003. (FS. 0866).

Order Capnodiales

Family Mycosphaerellaceae

Phloeospora maculans (Bérenger) Allesch. state of *Mycosphaerella mori*(Fuckel) F.A. Wolf – on living leaves of *Morus alba* L. (Moraceae). TP, Tonya district, centre of district, 660 m a.s. l., 26.09.2001. (FS. 0597).

Ph. ulmi (Fr.) Wallr. state of *Mycosphaerella ulmi* Kleb.– on living leaves of *Ulmus laevis* Pallas (Ulmaceae). GP, Yağlıdere district, Ayvat village, near Güllendere, 1260 m a. s. l., 27.09.2009. (FS. 0635).

Septoria berberidis Niessl (Anamorphic *Mycosphaerella*) – on living leaves of *Berberis crataegina* DC. (Berberidaceae). RP, Çamlıhemşin district, Kale village 1750 m a. s. l., 24.09.2001. (FS. 0531).

S. castaneicola Desm. (Anamorphic *Mycosphaerella*) – on living leaves of *Castanea sativa* Miller (Fagaceae). RP, Çayeli district, Çürükbel river basin, 1640 m a. s. l., 25.09.2001. (FS. 0659).

S. cornicola (DC.) Desm. (Anamorphic *Guignardia*) – on living leaves of *Cornus sanguinea* L. (Cornaceae). RP, Pazar district, centre of district, 10 m a. s. l., 02.08.1998. (FS. 262).

S. chelidonii Desm. (Anamorphic *Mycosphaerella*) – on living leaves of *Chelidonium majus* L. (Papaveraceae). RP, Çamlıhemşin district, near Zilkale, 700 m a. s. l., 24.09.2001. (FS. 0660).

S. ribis (Lib.) Desm. state of *Mycosphaerella ribis* (Sacc.) Lindau – on living leaves of *Ribes biebersteinii* Berl. ex DC. (Grossulariaceae). RP, Çayeli district, Çürükbel river basin, 1950 m a. s. l., 02.08.1999. (FS. 0345).

Order Pleosporales

Family Incertae sedis

Ascochyta teretiuscula Sacc. & Roum. (Anamorphic *Didymella*) – on living leaves of *Luzula forsteri* (Sm.) DC. (Juncaceae). RP, Çamlıhemşin district, near Zilkale, 600 m a. s. l., 24.09.2001. (FS. 0649).

Family Leptosphaeriaceae

Coniothyrium lignorum (Fr.) Sacc. (Anamorphic *Leptosphaeria*) – on dead branches of *Corylus avellana* L. (Betulaceae). RP, Çamlıhemşin district, Fırtına river basin, 1230 m a. s. l., 24.09.2001. (FS. 0535).

Family Phacosphaeriaceae

Sphaerellopsis filum (Biv.) B. Sutton state of *Eudarlucia caricis* (Fr.) O.E. Erikss. – on pustules of *Puccinia dioicae* Magnus on *Carex ovalis* Good. (Cyperaceae). RP, Çayeli district, Çürükbel river basin, 1330 m a. s. l., 25.09.2001. (FS. 0661); on pustules of *Kuehneola uredinis* (Link) Arthur on living leaves of *Rubus caesius* L. (Rosaceae). RP, Hemşin district, near Gidilmişdere, 1110 m a. s. l., 04.08.1999. (FS. 0375).

Class Incertae sedis

Order Incertae sedis

Family Incertae sedis

Cheirospora botryospora (Mont.) Berk. & Broome (Anamorphic *Pezizomycotina*) – on dead bark of *Fagus orientalis* Lipsky (Fagaceae). GP, Yağlıdere district, Derelitoprak village, near Acısu, 1400 m a. s. l., 27.09.2001. (FS. 0587).

Cytosporina ludibunda Sacc. (Anamorphic *Pezizomycotina*) – on dead branches of *Ulmus laevis* Pallas (Ulmaceae). GP, Yağlıdere district, Ayvat village, near Güllendere, 1260 m a. s. l., 27.09.2001. (FS. 0627).

Septocytia ruborum (Lib.) Petr. (Anamorphic *Pezizomycotina*) – on dead canes of *Rubus caesius* L. (Rosaceae). SP, Kurupelit, near the buildings Arts and

Sciences Faculty of the 19 Mayıs University, 100 m a. s. l., 28.09.2001. (FS. 0589).

Stilbospora macrosperma Pers. (Anamorphic *Pezizomycotina*) – on wood of *Carpinus betulus* L. (Betulaceae). GP, Espiye district, near Forest manager, 10 m a. s. l., 27.09.2001. (FS. 0628).

Class Leotiomycetes

Order Helotiales

Family Dermateaceae

Cylindrosporium state of *Blumeriella jaapii* (Rehm) Arx – on living leaves of *Prunus cerasus* L. (Rosaceae). RP, Çamlıhemşin district, Kale village, Çat high plateau, 1230 m a. s. l., 24.09.2001. (FS. 0517).

Marssonina populi (Lib.) Magnus state of *Drepanopeziza populorum* (Desm.) Höhn. – on living leaves of *Populus tremula* L. (Salicaceae). TP, Tonya district, centre of Tonya, 660 m a.s.l., 26.09.2001. (FS. 0587).

Family Incertae sedis

Cryptoclinecinerescens (Bubák) Arx (Anamorphic Helotiales) – on living leaves of *Quercus cerris* L. (Fagaceae). SP, Kurupelit, near the buildings Artys and Sciences Faculty of the 19 Mayıs University, 100 m a.s.l., 28.09.2001. (FS. 0592).

Monostichella robergei (Desm.) Höhn. (Anamorphic *Drepanopeziza*) – on living leaves of *Carpinus betulus* L. (Betulaceae). RP, İkizdere district, near Tron, 740 m a. s. l., 27.07.1998. (FS. 0656).

Sphaerographium niveum Dearn. & House (Anamorphic Helotiales) – on dead branches of *Rhamnus microcarpus* Boiss. (Rhamnaceae). RP, Çayeli district, Çürükbel high plateau, 2100 m a.s.l., 25.09.2001. (FS. 0653).

Order Incertae sedis

Family Incertae sedis

Epithyrium resinae (Sacc. & Berl.) Trotter state of *Sarea difformis* (Fr.) Fr. – on resin of *Picea orientalis* (L.) Link (Pinaceae). RP, Çayeli district, Çürükbel river basin, 1330 m a.s.l., 25.09.2001. (FS. 0653).

Hendersonia mali Thüm. (Anamorphic *Didymella*) – on leaves of *Malus sylvestris* Miller (Rosaceae). RP, Çayeli district, Esendağ village, 110 m a. s. l. 01.8.1998. (FS: 0254).

Class Sordariomycetes

Order Diaporthales

Family Cryphonectriaceae

Endothiella state of *Cryphonectria parasitica* (Murrill) M.E. Barr – on bark of *Castanea sativa* Miller (Fagaceae). GP, Espiye district, near Forestry Managed, 10 m a. s. l., 27.09.2001. (FS. 0617).

Family Diaporthaceae

Phomopsis diospyri (Sacc.) Traverso & Spessa (Anamorphic Diaporthae) – on dead branches of *Diospyros lotus* L. (Ebenaceae). GP, Yağlidere district. Kanlıca village, 230 m a. s. l., 27.09.2001. (FS. 0582).

Ph. stictica (Berk & Broome) Traverso (Anamorphic Diaporthe) – on dead branches of *Buxus sempervirens* L. (Buxaceae). RP, Rize town, near the Forestry Manager, 10 m a. s. l., 23.09.2001. (FS. 0657); RP, Çamlıhemşin district, Fırtına river, near Tozkaban, 930 m a. s. l., 24.09.2002. (FS: 0511).

Family Gnomoniaceae

Asteroma alneum (Pers.) B. Sutton (Anamorphic Gnomonia) – on living leaves of *Alnus glutinosa* (L.) Gaertner ssp. *glutinosa* (Betulaceae). RP, center of Pazar district, 30 m a. s. l., 23.06. 1998. (FS. 0096); on living leaves of *A. glutinosa* ssp. *glutinosa*. TP, Tonya district, 18th km from Vakfikebir to Tonya, 560 m a. s. l., 26.09.2001. (FS. 570); on living leaves of *A. glutinosa* ssp. *glutinosa*. GP, Yağlıdere district, Ayvat village, near Çildere, 1410 m a. s. l., 27.09.2001. (FS. 0603).

A. frondicola (Fr.) M. Morelet (Anamorphic Gnomonia) – on living leaves of *Populus tremula* L. (Salicaceae). RP, İkizdere district, İlica village, 640 m a. s. l., 05.08.1999. (FS. 0633).

Discula umbrinella (Berk. & Broome) M. Morelet state of *Apiognomonia errabunda* (Roberge ex Desm.) Höhn. – on living leaves of *Quercus cerris* L. (Fagaceae). SP, Kurupelit, near the buildings Arts and Sciences Faculty of the 19 Mayıs University, 100 m a. s. l., 28.09.2001. (FS. 0592).

Family Incertae sedis

Tubakia dryina (Sacc.) B. Sutton state of *Dicarpella dryina* Belisario & M.E. Barr – on living leaves of *Quercus hartwisiana* Steven (Fagaceae). RP, İkizdere district, near Tron, 740 m a. s. l., 27.07.1998. (FS.0105); on living leaves of *Q. pontica* C. Koch. RP, Güneysu district, Han high plateau, 1280 m a. s. l., 31.07.1998. (FS. 0231).

Family Melanconidaceae

Melanconium apiocarpum Link (Anamorphic Melanconis) – on bark of *Alnus glutinosa* (L.) Gaertner ssp. *glutinosa* (Betulaceae). GP, Espiye district, near Forestry Manager, 10 m a. s. l., 27.09.2001. FS.0656).

Family Pseudovalsaceae

Coryneum umbonatum Nees state of *Pseudovalsa longipes* (Tul.) Sacc. on dead branches of *Quercus sp.* (Fagaceae). TP, Tonya district, 18th km from Vakfikebir to Tonya, 560 m a. s. l., 26.09.2001. (FS. 0633).

Order Phyllachorales

Family Phyllachoraceae

Polystigma rubra (Pers.) Sacc. state of *Polystigma rubrum* (Pers.) DC. – on living leaves of *Prunus divaricata* Ledeb. (Rosaceae). RP, Çamlıhemşin district, Fırtına river, 1600 m a. s. l., 24.09.2001. (FS. 0524).

Order Xylariales

Family Amphisphaeriaceae

Discosia artocreas (Tode) Fr. (Anamorphic Amphisphaeriaceae) – on necrotic spots on living leaves of *Rhododendron ponticum* L. (Ericaceae). RP, Çamlıhemşin district, near Zilkale, 600 m a. s. l., 24.09.2001. (FS. 0652).

Monochaetia flagellata (Earle) Sacc. & D. Sacc. (Anamorphic Amphisphaeriaceae) – on living leaves of *Castanea sativa* Miller (Fagaceae). RP, Çayeli district, Uzundere river basin, 650 m a. s. l., 23.06.1998. (FS. 0066).

Seiridium intermedium (Sacc.) B. Sutton (Anamorphic Lepteutypa) – on dead twigs of *Ulmus laevis* Pallas (Ulmaceae). GP, Yağlıdere district, Ayvat village, near Güllendere, 1160 m a. s. l., 27.09.2001. (FS. 0658).

Truncatella angustata (Pers.) S. Hughes (Anamorphic Broomella) – on dead branches of *Corylus avellana* L. (Betulaceae). RP, Çayeli district, Çürükbel river basin, 700 m a. s. l., 25.09.2001. (FS. 0662).

Family Diatrypaceae

Libertella faginea Desm. state of *Eutypella quaternata* (Pers.) Rappaz, – on living bark of *Fagus orientalis* Lipsky (Fagaceae). GP, Espiye district, near Forest manager, 10 m a. s. l., 27.09.2001. (FS. 0620).

Family Incertae sedis

Dinemasporium strigosum (Pers.) Sacc. state of *Phomatospora dinemasporium* J. Webster – on dead leaves of *Carex diluta* Bieb. (Cyperaceae). RP, Çamlıhemşin district, near Zilkale, 600 m a. s. l., 24.09.2001. (FS. 0651); on wood of *Castanea sativa*. GP, Yağlıdere district, Ayvat village, near Çildere, 1410 m a. s. l., 27.09.2001. (FS. 0596).

The recorded fungi species were revealed on 29 host plants species from 20 families. The largest species number was registered on Fagaceae (17%). In other families 1–2 species of coelomycetous fungi were registered.

From determined 46 Coelomycetous species only 14 (30.4%) are linked to their sexual stage, 8 (17.4%) are linked to a family and 2 (4.3%) are linked to an order. 5 (10.7%) species are linked to subdivision (Pezizomycotina) and 18 (39.1%) to a genera of teleomorphic fungi. Among collected Coelomycetous fungi different types of conidiomata have been registered: pycnidial (17 species), acervular (17), stromatic (9), pseudostromatic (2) and pycnothyrial (1).

When results of the study were analyzed in terms of trophic structure: twenty three species are phyllophagous, 22 species are xylophagous and 1 species developed on resins. Ten species of xylophagous are saproxylophagous, 11 species are bioxylophagous or pathogenic. Twenty species of phyllophagous are biophyllophagous or pathogenic and 2 species are saprophyllotrophs.

Some fungi species have been developed on various species of host plants, not only of the same genus, but of different genera and families. For example; *Dinemasporium strigosum* found on dead leaves of *Carex diluta* and on wood of *Castanea sativa*; *Sphaerellopsis* state of *Eudarlucella caricis* found on living leaves of *Carex ovalis* and *Rubus caesius* as hyperparasite on *Puccinia dioicae* var. *dioicae* and *Kuehneola uredinis*; *Tubakia dryina* found on living leaves of *Quercus hartwissiana* and *Q. pontica*, while various fungi species were recorded growing on the same host plant and substrate jointly. For example: *Asteroma frondicola*, *Marssonina populi* recorded on living leaves of *Populus tremula*; *Diplodia buxicola*, *Dothiorella candollei*, *Phomopsis stictica* develop on branches of *Buxus sempervirens*, etc.

The most widespread fungi that cause the strongest injuries of plants were *Septoria castaneicola* on living leaves of *Castanea sativa*, *Asteroma alneum* on living leaves of *Alnus glutinosa* ssp. *glutinosa*, *A. frondicola* on living leaves of *Populus temula*, *Discula umbrinella* and *Cryptocline cinerescens* on living leaves of *Quercus cerris*, *Marssonina* state of *Drepanopeziza populorum* on living leaves of *Populus tremula*, *Monostichella robergei* on living leaves of *Carpinus betulus*, *Phloeospora* state of *Mycosphaerella ulmi* on living leaves of *Ulmus laevis*, and *Phyllosticta consentrica* on living leaves of *Hedera helix*.

From saprobic Coelomycetes *Cytosporina ludibunda* on branches of *Ulmus laevis*, *Sphaerographium niveum* on dead branches of *Rhamnus microcarpus* and *Seiridiumintermedium* on dead twig of *Ulmus laevis*, *Epithyrium* state of *Sareadiformis* on resin of *Picea orientalis*, *Septocytia ruborum* on dead canes of *Rubus caesius*, *Truncatella angustata* on dead branches of *Corylus avellana* and *Stilbospora macrosperma* on wood of *Carpinusbetulus* are rarely.

CONCLUSIONS

These results elucidated that majority of Coelomycetes represented by members of Dothideomycetes (19 species) and Sordariomycetes (16 species) classes. From determinerd 46 Coelomycetous one species is hipereparasite,23 species are phyllothrophs, 22 species are xylothrophs and one species developed on resinae. Ten species of xylothrophs are saproxylotrophs, 11 species are bioxylotrophs or pathogenic. Twenty species of phyllotrophs are biophyllotrophs or pathogenic and 2 species are saprophyllotrophs.The recorded fungi species on 29 species of host plants from 20 families were revealed.

REFERENCES

- Akgül, H.Selçuk, F.&Hüseyin, E. (2002): Contribution to Turkey mycobiota. I. Microfungi were collected in İnönü University campus. In Proceeding of the XVIth National Congress on Biology. İnönü University, September 4-7, 2002. Malatya, Turkey.P. 127.
- Akgül, H., Yılmazkaya, D. & Hüseyin, E. (2012a): Microfungi on some *Salicaceae* members in Uludağ forests. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey. P. 55.
- Akgül, H.Yılmazkaya,D. &Hüseyin, E. (2012b): Xylotrophs microfungi on trees of Uludağ forests. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey.P. 57.
- Akgül, H. Yılmazkaya,D. &Hüseyin, E. (2012c): Microfungi diversity in Uludağ forests. In Proceeding of the VIII International Conference “Problems of forest phytopyahology and mycology”. Ulyanovsk, October 15-19, 2012. Ulyanovsk-Moscow-Petrozavodsk, Russia. P. 101-103.
- Bremer, H. &Petrak,F. (1947): Neue Kleinepilze aus der Turkei. *Sydowia. Annales Mycologici.*, II 1(1-3): 248-263.
- Bremer, H. IsmenH.Karel,G. &Özkan, M.(1948): Beitrage zur Kenntnis der parasitischen Pilze der Türkei.Teil III.*Revue de la Facultédes Sciences de l'Université d'Istanbul.*,Serie B. 13(1): 1-53.

- Bremer, H. Karel, G. Bıyıkoglu, K. Göksel, N. & Petrak, F. (1952a): Beitrage zur Kenntnis der parasitischen Pilze der Türkei. Teil V. *Revue de la Faculté des Sciences de l'Université d'Istanbul*, Serie B. 17(3): 259-276.
- Bremer, H. Karel, G. Bıyıkoglu, K. Göksel, N. & Petrak, F. (1952b): Beitrage zur Kenntnis der parasitischen Pilze der Türkei. Teil VII. *Revue de la Faculté des Sciences de l'Université d'Istanbul*, Serie B. 17(4): 277-288.
- Cannon, P.F. & Kirk, P.M. (2007): *Fungal Families of the World*. CABI Publishing, UK, 456 pp.
- Davis, P.H. (eds). (1965-1985): *Flora of Turkey and East Aegean Islands*. 9 vols. Edinburgh University Press, Edinburgh.
- Demirci, E. Zengin, H. Eken, C. & Tamer, Ü.A. (1998): Parasitic fungi determined on the weeds in Erzurum province. In Proceeding of the Turkey 11th herbological conference. Egri Univ. Press. Bornova-Izmir. P. 55-61.
- Ellis, B.M. & Ellis, J. P. (1987): *Microfungi on land plants*. Croom Helm, London & Sydney, 818 pp.
- Erdoğan, M. 2008. New microfungi records for Turkey from Kemaliye district (Erzincan). In Proceeding of the 19th National Congress on Biology. Karadeniz Technical University, June 23-27, 2008. Trabzon, Turkey. P. 473.
- Erdoğan, M. & Hüseyin, E. (2006): Current status of the genus *Phyllosticta* Pass. in Turkey. Plant, fungal and habitats diversity investigation and conservation. In Proceeding of the IVth Balcan Botanical Congress. Sofia, June 20-26, 2006. Sofia, Bulgaria. P. 76.
- Erdoğan, M. & Hüseyin, E. (2008a): New *Phyllosticta* records for Turkey. In Proceeding of the 19th National Congress on Biology. Karadeniz Technical University, June 23-27, 2008. Trabzon, Turkey. P. 474.
- Erdoğan, M. & Hüseyin, E. (2008b): Microfungi of Kurtboğazi dam (Ankara) and its environment. *The Herb Journal of Systematic Botany*, 14(1): 131-150.
- Erdoğan, M. & Hüseyin, E. (2009): An anamorphic genus and species newly record from Turkey. *Mycotaxon*, 109: 9-14.
- Erdoğan, M. & Hüseyin, E. (2011): Some Micromycetes Determined on *Carpinus* L. in Küre Mountains National Park Ecosystems. *The Journal of Fungus of Selçuk University*, 2(1-2): 25-35.
- Erdoğan, M. & Hüseyin, E. (2012): Some micromycetes determined on *Fagus orientalis* Lipsky in Küre Mountains national park forest ecosystems. In Proceeding of the VIII International Conference "Problems of forest phytopathology and mycology". Ulyanovsk, October 15-19, 2012. Ulyanovsk-Moscow-Petrozavodsk, Russia. P. 113-115.
- Erdoğan, M. Hüseyin, E. Doğan, G. Duran, S. & Yılmaz, M. (2012). The status of *Marssonina* Magnus species were registered in Turkey. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey. P. 209.
- Erdoğan, M. Hüseyin, E. & Özbek, U. (2007): New Records of Microfungi species for Turkey. In Proceeding of the 7th International Symposium "Plant Life of South-West Asia" (7th PLoSWA). Eskişehir, June 25-29, 2007. Eskişehir, Turkey. P. 77.
- Erdoğan, M. Selçuk, F. & Hüseyin, E. (2010a): Pathogenic filamentous microfungi on forest trees and shrubs in Küre Dağları Mountains National Park. In Proceeding of the Environmental Symposium. Aksaray University, May 5-7, 2010. Aksaray, Turkey. P. 185.

- Erdoğan, M. Selçuk, F. Hüseyin, E. & Ay E. (2010b): Microfungi determined on walnut (*Juglans regia* L.) in Turkey. In Proceeding of the Environmental Symposium. Aksaray University, May 5-7, 2010. Aksaray, Turkey. P. 187.
- Gehlot, P. Attitalia, I. H. & Salleh, B. (2010): Anamorphic fungi: an overview. *Middle-East Journal of Scientific Research*, 6(3): 201-208.
- Göbelez, M. (1964): La Mycoflore de Turquie. II. *Mycopathologia et Mycologia Applicata*, 23(1): 47-67.
- Göçmen, E. Hüseyin, E. & Cebeci, C. C. (2012): Microfungi were collected in ecosystems of Bitlis province. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey. P. 184.
- Göçmen, E. Vural, M. Hüseyin, E. & Selçuk, F. (2011): Some seed plants in Ecosystems of Kurtuluş Ridges (Bitlis) and their microfungi. *Artvin Coruh University Faculty of Forestry Journal*, 12(1): 68-71.
- Grove, W. B. (1935): *British stem-and leaf fungi. Coelomycetes*, Vol: 1. University Press, Cambridge, 488 pp.
- Grove, W. B. (1937): *British Stem-and leaf fungi. Coelomycetes*, Vol: 2. University Press, Cambridge, 405 pp.
- Güven, K. & Tamer, A. U. (1993): Some parasitic fungi determined in plants living in Eskişehir. *Journal of Science Faculty of Ege University*, B 15(2): 25-32.
- Hüseyin, E. (2004): Xylotrophic micromycetes of Ihlara Valley (Kapadokya, Turkey). Biology, Systematics and Ecology of Fungi in Natural and Agricultural Ecosystems. In Proceeding of the International Sciences Conference. National Academy of Sciences of Belarus. V. F. Kuprevich Institute of Experimental Botany. Minsk, September 20-24, 2004. Minsk "Pravo i ekonomika". P. 72-75.
- Hüseyin, E. Bülbül, A. S. & Akgül, H. (2009): Some notes on micromycetes from Turkey. *Pak. J. Bot.*, 41(1): 453-459.
- Hüseyin, E. & Erdoğan, M. (2006): The genus *Septoria* Sacc. in Turkey. Plant, fungal and habitats diversity investigation and conservation. In Proceeding of the IVth Balcan Botanical Congress. Sofia, June 20-26, 2006. Sofia, Bulgaria. P. 77.
- Hüseyin, E. & Erdoğan, M. (2008): New records of *Gloeosporium* for Turkey. In Proceeding of the 19th National Congress on Biology. Karadeniz Technical University, June 23-27, 2008. Trabzon, Turkey. P. 474.
- Hüseyin, E. Erdoğan, M. & Bülbül, A. S. (2007): A new species of *Cylindrosporium*. *Mycotaxon*, 101: 325-330.
- Hüseyin, E. Erdoğan, M. Selçuk, F. & Akgül H. (2011): The Trophical structure of microfungi in forest ecosystems. In Proceeding of the Environmental Symposium. Düzce University, May 5-7, 2011. Düzce, Turkey. P. 110.
- Hüseyin, E. Karahan, M. & Gaffaroglu, M. (2004): Micromycetes of Kurtboğazı reservoir-field phytocoenoses (Middle Anatolia). Biology, Systematics and Ecology of Fungi in Natural and Agricultural Ecosystems. In Proceedings of the International Sciences Conference. National Academy of Sciences of Belarus. V. F. Kuprevich Institute of Experimental Botany. Minsk, September 20-24, 2004. Minsk "Pravo i ekonomika". P. 75-78.
- Hüseyin, E. & Selçuk, F. (2000): The Pycnidial phyllostrophs on forest kinds of Rize province. In Proceeding of the XVth National Congress on Biology "with international participation". Ankara University, Faculty of Science, Department of Biology, September 5-9, 2000. Ankara-Turkey. 1: 44-48.

- Hüseyin, E.& Selçuk, F. (2001a): New records of microfungi genera for Turkey. In Proceeding of the 2nd Balkan Botanical Congress. Plants of the Balkan Peninsula: into the next Millennium. Istanbul University Press I: 245-248.
- Hüseyin, E.& Selçuk, F. (2001b): New and Poorly Known Genera of Microfungi for Turkey. *Turk. J. Bot.* 25(6): 437-438.
- Hüseyin, E.& Selçuk, F. (2002a): *Septoria oleandriicola* sp.nov., a new species from *Nerium oleander* in Turkey. *Mycological Progress.*, 1(2): 143-145.
- Hüseyin, E.& Selçuk, F. (2002b): A New species of *Colletotrichum*. *Israel J. Plant Sciences.*, 50(2): 161-163.
- Hüseyin, E.Selçuk, F. &Erdoğan, M.(2012a):Microfungi of Yozgat Çamlığı National Park.In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey. P. 190.
- Hüseyin, E. Selçuk,F. Erdoğan, M. Sarıoğlu, H. C. &Günaydin, M. (2012b): The Fungi species of *Coniothyrium* Sacc. genus in Turkey Ecosystems.In Proceeding of the Environmental Symposium2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey.P. 185.
- Hüseyin, E. Selçuk, F. Tural, A. A. &Altıntaş, C.(2012c):The Fungi species of *Cylindrosporium* Sacc. genus in Turkey Ecosystems. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, May 3-5, 2012. Kilis, Turkey.P. 186.
- Hüseyin, E.Selçuk, F. & M. Gaffaroglu, M.(2005a): Xylotrophic micromycetes on forest trees and shrubs of Betulaceae family on the Black Sea coast of Turkey (Rize Province). In Proceeding of the 6th International Conference "Problems of forest phytopathology and mycology". Petrozavodsk, September 18-22, 2005. Moscow-Petrozavodsk (Russia).P. 94-98.
- Hüseyin, E. Selçuk, F. & M. Gaffaroglu, M. (2005b):Material on the micromycetes of Box tree (*Buxus*) and *Rhododendron* from Turkey. In Proceeding of the XVI Symposium of Mycologists and Lichenologists of Baltic States. Cesis, September 21-25, 2005. Latvia. P. 62-68.
- Hüseyin, E. Selçuk, F. &Şahin A.(2005c). The World's second record of *Neoheteroceras flageoletii* reported from Turkey. *Mycotaxon.*, 94: 241-144.
- Hüseyin, E., F. Selçuk, M. Yıldızbaş. 2006. Coelomycetes in Turkey. The genus *Phoma* Sacc. Plant, fungal and habitats diversity investigation and conservation. In Proceeding of the IVth Balkan Botanical Congress. Sofia, June 20-26, 2006. Book of Abstracts. Sofia. P. 77.
- Hüseyin, E.&Yıldızbaş, M.(200): Some micromycetes on oak (*Quercus*) in Karaman Province of Turkey. In Proceeding of the XVI Symposium of Mycologists and Lichenologists of Baltic States. Cesis, September 21-25, 2005. Latvia. P. 69-75.
- Hüseyinov, E. (2000): New Records of microfungi for Turkey. *Israel J. Plant Sciences* 48(1); 75-78.
- Hüseyinov, E.&Selçuk, F.(2000): The Phyllostroph Micromycetes on forest plants on the Black Sea coast of Turkey (Rize Province). Mycology and Cryptogamic Botany in Russia: Traditions and Modern State. In Proceeding of the International Conference devoted to 100th Anniversary of Investigations on Mycology and Cryptogamic Botany in V.L. Komarov Botanical Institute RAS. Saint-Petersburg, April 24-28, 2000. Saint-Petersburg. P.296-298.
- Hüseyinov, E. & Selçuk, F.(2001): Contribution to study of Mycoflora of Turkey.I. Coelomycetes of orders Melanconiales and Sphaeropsidales on forest trees and shrubs

- in the Black Sea coast (Rize and Trabzon provinces). *Mikologia i Fitopatologia.*, 35(1): 28-33.
- Ignatavičiūtė, M. & Traigienė, A.(1998):*Mycota Lithuaniae. IX, Melanconiales*.UAB "Valstiečių laikraštis", Vilnius,247 pp.
- Index Fungorum. 2013. <http://www.indexfungorum.org/Names/Names.asp>
- Karel,G.A. (1958):*A Preliminary List of Plant Diseases in Turkey*. Ayyıldız Matbaası. Ankara, 44 pp.
- Kirk, P.M.Cannon,P.F. Minter, D.W.& Stalpers, J.A.(2008):*Dictionary of the Fungi*, 10th edn. CABI, Wallingford, 784 pp.
- Kırbağ, S. (2004): New records of microfungi from Turkey. *Pak.J.Bot.*, 36(2): 445-448.
- Lohwag, K. (1963): Mycologische Notizen aus dem Belgrader Wald bei Istanbul in der Türkei. *Sydowia. Annales Mycologici.*, II. 16 : 199-204.
- Mel'nik, V. (2000): *Key to the fungi of the genus Ascochyta Lib. (Coelomycetes)*. Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft. Heft 379. Berlin-Dahlem, 192 pp.
- Mel'nik, V. Hüseyin,E. & Selçuk, F. (2004):Contribution to the studying of micromycetes in several Black Sea Provinces of Turkey. *Novitates Systematicae Plantarum non Vascularum. Petropolis "Nauka"* 37: 133-148.
- Mel'nik, V. & Popushoy, I.S. (1992):*Nesovershennye griby na drevesnykh i kustarnikovykh porodakh*. "Shtiintsa", Kisinev, 362 pp.
- Merezhko, T.A. (1980):*Flora of fungi of SSR Ukraina. Order Sphaeropsidales, Family Sphaeropsidaceae (Phaeodidymae)*. Naukova Dumka. Kiev, 208 pp. (In Russian).
- Nag Raj, T.R.(1993):*Coelomycetous anamorphs with appendage-bearing conidia*. Department of Biology University of Waterloo. Waterloo, Ontario, Canada, 1101 pp.
- Öner, M. Dizbay,V. Uçar, F.& Karaboz, İ.(1984): Some parasitic fungi of southwestern Anatolia and Konya Province. *Doğa Bilim Dergisi.*, 8(3): 401-404.
- Petrak, F. (1953): Neue Beitrage zur Pilzflora der Türkei.*Sydowia. Annales Mycologici.*, II. 7(1-4): 14-44.
- Petrak, F. (1957): Beitrage zur türkischen Pilzflora. *Sydowia. Annales Mycologici.*, II. 10(1-6):101-111
- Selçuk, F.&Hüseyin,E. (2000):The Melanconial phyllostrophs on forest kinds of Rize province. In Proceeding of the XVth National Congress on Biology "with international participation". Ankara University, Faculty of Science, Department of Biology, September 5-9, 2000. Ankara-Turkey 1: 40-43.
- Selçuk, F. &Hüseyin,E.(2001): New recoprds of microfungi species for Turkey. In Proceeding of the 2nd Balkan Botanical Congress held at Istanbul, May 14-18, 2000. Plants of the Balkan Peninsula: into the next Millenium. I. Istanbul University Press, Turkey.1: 337-342.
- Selçuk, F.&Hüseyin, E. (2005): Contribution to studying of micromycetes on forest trees of Fagaceae family on the Black Sea coast of Turkey. In Proceeding of the 6th International Conference "Problems of forest phytopathology and mycology". Petrozavodsk, September 18-22, 2005. Moscow-Petrozavodsk (Russia).P. 290-296.
- Selçuk, F.&Hüseyin, E.(2012): Review of micromycetes of Mt. Istranca forest in Turkey. In Proceeding of the VIII International Conference "Problems of forest phytopayhology and mycology". Ulyanovsk, October 15-19, 2012. Ulyanovsk-Moscow-Petrozavodsk, Russia. P. 108-113.
- Selçuk, F.Akgül, H. &Hüseyin,E. (2002):Contribution to Turkey mycobiota. II. Microfungi were collected in Firat University campus. In Proceeding of the XVIth National

- Congress on Biology. İnönü University, September 4-7, 2002. Malatya, Turkey. P. 131.
- Selçuk, F. Erdoğan, M. Hüseyin, E. & Göçmen, E. (2010a): Türkiye'den rapor edilmiş piknidial, aservulal ve stromatal yapılı eşeysiz üreyen mikrofunguslar. Environmental Symposium. Aksaray University, May 5-7, 2010. Aksaray, Turkey. P. 186.
- Selçuk, F. Erdoğan, M. Hüseyin, E. & Karakaş, Z. (2010b): Contribution to Turkey mycobiota. III. Microfungi were collected in Kırşehir phytocoenoses. In Proseeding of the Environmental Symposium. Aksaray University, May 5-7, 2010. Aksaray, Turkey. P. 184
- Selçuk, F. Erdoğan M. Akgül, H. & Hüseyin, E. (2009): The genus *Septoria* Sacc. in Turkey. *Mycopath.*, 7(1): 21-28.
- Selçuk, F. Hüseyin, E. & Bitmiş, K. (2003): Some materials on mitosporic fungifrom Turkey. II. Coelomycetes. *Botanica Lituanica.*, 9(2): 161-170.
- Selçuk, F. Hüseyin, E. Eşsiz, E. & Kartal, N. (2012a): Microfungi of the genus *Phoma* Sacc. were determined in Turkey ecosystems. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, 2-5 May, 2012. Kilis, Turkey. P. 188.
- Selçuk, F. Hüseyin, E. Gündoğan, T. & Özkan, E. (2012b): Microfungi of the genus *Phyllosticta* Pers. were determined in Turkey ecosystems. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, 2-5 May, 2012. Kilis, Turkey. P. 189.
- Selçuk, F. Hüseyin, E. Nur, A. D. & Morçişek, F. (2012c): The Fungi of genus *Diplodia* Fr. Turkey ecosystems. In Proceeding of the Environmental Symposium 2012. Kilis 7 Aralık University, 2-5 May, 2012. Kilis, Turkey. P. 187.
- Selçuk, F. Hüseyin, E. & Şahin, A. (2004): Xylotrophic micromycetes of beech in forest of RP of Turkey. Biology, Systematics and Ecology of Fungi in Natural and Agricultural Ecosystems. Proceedings of the International Sciences Conference. National Academy of Sciences of Belarus. V. F. Kuprevich Institute of Experimental Botany. Minsk, September 20-24, 2004. "Pravo i ekonomika", Minsk. P. 301-303.
- Sutton, B. C. (1980): *The Coelomycetes. Fungi imperfecti with Pycnidia, Acervuli and Stromata*. CABI Publishing, 696 pp.
- Tamer, A. U. Altan, Y. & Gücin, F. (1989): Some parasitic fungi determined on the flora of Gülveren Village (Erzurum-Şenkaya). *Journal of Anadolu University Arts and Sciences Faculty.*, Anadolu Univ. Press. Eskişehir, 1(2): 45-55.
- Tamer, A. U. Altan, Y. & Gücin, F. (1990): Some parasitic fungi determined in flora of east Anatolian region. *Türk. J. Bot.*, 14(2): 83-86.
- Tamer, A. U. Gücin, F. & Altan, Y. (1987): Some parasitic fungi determined in plants living in Pötürge district of Malatya. In Proceeding of the VIIIth Biological Congress. Botanical Information. Ege Univ. Press. Izmir, Turkey. P. 202-217.
- Teterevnikova-Babayan, D. N. Taslakhchyan, M. G. & Martirosyan, I. A. (1983): Mycoflora of Armenian SSR. Tom 6. I. Sphaeropsidales with unicellular and hyaline conidia. Erevan Univ. Press. Erevan, 304 pp. (In Russian).
- Vassiljevsky, N. I. & Karakulin, B. P. (1950): *Fungi Imperfecti parasitici. Pars II. Melanconiales*. Typis et Impensis Academiae Scientiarum URSS. Mosqua-Leningrad, 680 pp.
- Wijayawardene, N. N. McKenzie, E. H. C. Chukeatirote, E. Wang, Y. & Hyde, K. D. (2012): Coelomycetes. *Cryptogamie, Mycologie*, 33(3) Numero special Coelomycetes: 215-244.

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**GLJIVE *COELOMYCETOUS* U NEKOLIKO ŠUMSKIH EKOSISTEMA
U PROVINCIJAMA PORED CRNOG MORA U TURSKOJ**

SAŽETAK

Kao rezultat studije, u ovoj oblasti je identifikovano četrdeset šest vrsta gljive *Coelomycetes*. Ove vrste se dijele u 37 rodova, 20 porodica, 9 redova i 4 razreda *Ascomicota* (Klasa *Dothideomycetes*: 3 reda, 6 porodica, 11 rodova i 19 vrsta; *Leotiomycetes*: 2, 3, 7 i 7; *Sordariomycetes*: 3, 10, 14 i 16 ; neodređeno mjesto - *Incertae sedis*: 1, 1, 4 i 4 respektivno). Iz utvrđenih 46 *Coelomycetes* vrsta samo 14 (30,4%) je povezano sa seksualnom fazom, 8 (17,4%) sa porodicom, 2 (4,3%) sa redom. Pet vrsta (10,9%) su (*Pezizomycotina*) i 18 (39,1%) na rodova od teleomorphic gljiva. Među prikupljenim *Coelomicetous* gljivama registrovani su različiti tipovi conidiomata: pycnidial (17 vrsta), acervular (17), stromatic (9), pseudostromatic (2) i pycnothirial (1).

Ključne riječi: *Coelomycetes*, gljive, šumski ekosistemi, Crno more