



Two New Records for Turkey: *Ophiobolus erythrosporus* and *Leptosphaeria modesta*

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Abstract: *Ophiobolus erythrosporus* (Riess) G. Winter and *Leptosphaeria modesta* Rabenh. are new records for Turkish mycobiota. Distinguishing morphological characters of these species are described and their photographs are provided.

Key words: Microfungi, *Pleosporales*, New records, Turkey.

Türkiye İçin İki Yeni Kayıt: *Ophiobolus erythrosporus* ve *Leptosphaeria modesta*

Öz: *Ophiobolus erythrosporus* (Riess) G. Winter ve *Leptosphaeria modesta* (Desm.) Rabenh. Türkiye mikobiyotası için yeni kayıttır. Bu türlerin ayırt edici morfolojik karakterleri tanımlanmış ve fotoğrafları verilmiştir.

Anahtar kelimeler: Mikromantarlar, *Pleosporales*, Yeni kayıtlar, Türkiye.

Introduction

Ophiobolus Riess was introduced with *Ophiobolus disseminans* Riess (*Phaeosphaeriaceae*) as the type species. The genus is characterized by its solitary to clustered ascomata, immersed to erumpent, spherical to obpyriform, brown to black, with a conical papilla; numerous, long-cylindrical, fissitunicate asci; and multiseptate, yellow to brown scolecosporeous ascospores (Shoemaker, 1976, Walker, 1980). *Ophiobolus graminis* (Sacc.) Sacc., *O. miyabeanus* S. Ito & Kurib. and *O. periclymeni* (P. Crouan & H. Crouan) Sacc. were recorded from Turkey (Aktaş et al., 1996, Göbelez, 1963, Selçuk et al., 2016). Of these, *O. graminis* and *O. miyabeanus* were transferred to the genera *Gaeumannomyces* and *Bipolaris* respectively.

The genus *Leptosphaeria* Ces. & De Not. is saprobic or pathogenic on stems and leaves of herbaceous or woody plants in terrestrial habitats. Even though *Leptosphaeria* shares some similar morphological characters with

Amarenomyces O.E. Erikss., *Bricookea* M.E. Barr, *Kalmusia* Niessl, *Entodesmium* Riess, *Melanomma* Nitschke ex Fuckel, *Nodulosphaeria* Rabenh., *Paraphaeosphaeria* O.E. Erikss., *Passeriniella* Berl., *Phaeosphaeria* I. Miyake and *Trematosphaeria* Fuckel, it differs in producing ascomata on dicotyledonous hosts, in having cylindrical asci with short bulbous pedicels and smooth-walled, fusoid, multi-septate ascospores (Ariyawansa et al., 2015). *Leptosphaeria* is one of the largest genera of the *Leptosphaeriaceae*, accommodating more than 1600 taxa (Crane and Shearer, 1991). In Turkey, the species of *Leptosphaeria* are poorly known and not yet intensively studied. Some species of *Leptosphaeria* have been recorded in Turkey (*Leptosphaeria acuta* (Fuckel) P. Karst. on *Urtica dioica* L. (Baydar, 1975), *L. affinis* P. Karst. on *Verbascum* sp. (Baydar, 1982), *L. davisiana* Petr. on *Scutellaria brevibracteata* L. (Karel, 1958), *L. fuckelii* Niessl on *Fibigia clypeata* (L.) Medik. (Erdoğan and Hüseyin, 2008), *L. lusitanica*



Thüm. on *Spartium junceum* L. and *L. tolgoensis* Petr. on *Euphorbia* sp. (Petraik, 1953), *L. platycarpa* Sacc. on *Juglans regia* L. (Selçuk et. al. 2015), *L. rusci* (Fr.) Sacc. on *Ruscus aculeatus* L. (Göbelez, 1963), *L. vagabunda* Sacc. on *Berberis crataegina* L. (Baydar, 1975) etc.).

The current study deals with two microfungi species collected from Erciyes Mountain in Kayseri province and aims to make a contribution to the mycobiota of Turkey.

Materials and Methods

Plant specimens infected with microfungi were collected from Erciyes Mountain in Kayseri province of Turkey. The host specimens were prepared according to the conventional herbarium techniques. Host plants were identified using the Flora of Turkey and East Aegean Islands (Davis, 1965-1985). The fungal specimens were isolated from the host plants by obtaining thin sections. Microscopic examination and microphotographs were done by means of Leica DM E light microscope. The fungi were identified using relevant literature (Dennis, 1981, Ellis and Ellis, 1987, Shoemaker, 1976 – for *Ophiobolus*; Dennis, 1981, Ellis and Ellis, 1987 – for *Leptosphaeria*). All specimens examined were deposited in the Mycology Laboratory of Ahi Evran University, Arts and Sciences Faculty, Department of Biology and have collection numbers of Gökhan DOĞAN (GD). Identified species and their author's names are given according to Index fungorum database (accessed 2017).

Results

Ascomycota Caval.-Sm.

Pleosporales Luttr. ex M.E. Barr

Leptosphaeriaceae M.E. Barr

Leptosphaeria Ces. & De Not.

Leptosphaeria modesta (Desm.) Rabenh.

Syn.: *Sphaeria modesta* Desm., *Leptosphaeria modesta* var. *cibostii* (Ces. & De Not.) Sacc., *Heptameria cibostii* (Ces. & De Not.) Cooke, *Sphaeria modesta* var. *rubellula* Desm., *Leptosphaeria modesta* var. *rubellula* (Desm.) Sacc., *Leptosphaeria modesta* Rabenh. var.

modesta, *Heptameria modesta* (Rabenh.) Cooke, *Nodulosphaeria modesta* (Rabenh.) Munk ex L. Holm.

The characteristic features: Perithecia scattered, at first immersed in the tissue later becoming erumpent, unilocular, globose to pyriform, 230-450 µm diam., blackish. Asci numerous, cylindrically-clavate, attenuate at the base, 8-spored, 83-106 × 13-16 µm. Ascospores cylindric, mostly 4-septate, occasionally 6-septate, constricted at the septum, rounded both ends, 37.5-45 (-50) × 6-7 µm, pale olive-brown, ends bearing a small, rounded, 2-5 µm long, hyaline appendage, second cell from the top shorter and broader than the rest (Figure 1).

Specimens examined: Kayseri province, Erciyes mountain, Develi district, tree plantation area, on dead branches of *Scrophularia* sp. (Scrophulariaceae), 38°28'977"N, 35°30'665"E, 2000-2050 m, 25.07.2011, GD 1099; Kayseri province, Erciyes mountain, Develi district, tree plantation area, on dead branches *Rumex* sp. (Polygonaceae), 38°28'977"N, 35°30'665"E, 2000-2050 m, 25.07.2011, GD 1095.

Phaeosphaeriaceae M.E. Barr

Ophiobolus Riess

Ophiobolus erythrosporus (Riess) G. Winter

Syn.: *Sphaeria erythrospora* Riess, *Ophiobolus erythrosporus* (Riess) G. Winter f. *erythrosporus*, *Nodulosphaeria erythrospora* (Riess) L. Holm, *Rhaphidophora urticae* Rabenh., *Ophiobolus urticae* (Rabenh.) Sacc., *O. urticae* (Rabenh.) Sacc. var. *urticae*, and *O. urticae* var. *clematidis* Berl.

The characteristic features: Ascocarps scattered or in groups, at first immersed in the tissue later becoming erumpent, globose, 170-335 µm diam, blackish; neck erumpent, terete, 25 µm long. Asci numerous in a broad hymenium, cylindric to clavate, 114-151 × 11-12.5 µm, 8-spored. Ascospores parallel in one fascicle, cylindrical, attenuated both ends, 13-17-septate, with one short cell a little above the middle distinctly swollen, becoming curved when released from the ascus, (81-) 85-124 (-130) × 3-3.5 (-4) µm, guttulate, pale yellow (Figure 2).



Figure 1. *Leptosphaeria modesta*: a. vertical section of an ascoma, b. ascus, c. ascospores, d. ascospore with hyaline appendage.



Figure 2. *Ophiobolus erythrosporus*: a. vertical section of an ascoma, b. asci, c. ascospores, d. ascospore.



Specimens examined: Kayseri district, Kayseri memorial forest, on dead branches of *Teucrium polium* L. (Lamiaceae), 38°36'134"N, 35°30'581"E, 1850-1900 m, 25.07.2011, GD 1108; Kayseri province, Erciyes mountain, Develi district, tree plantation area, on dead branches *Alkanna orientalis* (L.) Boiss. (Boraginaceae), 38°28'977"N, 35°30'665"E, 2000-2050 m, 25.07.2011, GD 1094.

Discussion

Leptosphaeria modesta is found on dead stems of many herbaceous plants. This fungus was known from Austria on *Thlaspi goesingense* Halácsy (Petraik, 1959), from China on *Bupleurum scorzonerifolium* Willd. (Tai, 1979), from Denmark on *Geum* sp., *Lotus* sp. and *Solidago* sp. (Munk, 1957), from England on *Aconitum* sp., *Bupleurum* sp., *Phyteuma* sp., *Sanguisorba* sp., *Scabiosa columbaria* L., *Scrophularia* sp., *Seseli* sp. and *Tofieldia* sp. (Dennis, 1981), from France on *Digitalis lutea* L. (Crane and Shearer, 1991), from Greenland on *Angelica archangelica* L. (Conners, 1967), from India on *Chrysanthemum richteria* Benth., *Draba lanceolata* Royle, *Eritrichium* sp. and *Scrophularia scabiosaefolia* Benth. (Wehmeyer, 1963), from Ireland on *Scabiosa succisa* L. (Muskett and Malone, 1983), from Poland on *Aconitum firmum* Rchb., *Angelica sylvestris* L., *Betonica officinalis* L., *Bupleurum longifolium* L., *Clinopodium vulgare* L., *Digitalis grandiflora*

Mill., *Lonicera* sp., *Pimpinella saxifraga* L., *Scabiosa ochroleuca* L., *Scrophularia nodosa* L., *Solidago virgaurea* L. and *Torilis japonica* (Houtt.) DC. (Mulencko et al., 2008), from Portugal on *Coptis aspleniifolia* Salisb. (Unamuno, 1941), from Russia on *Campanula* sp. (Babuschkina, 1995), from Ukraine on *Cephalaria coriacea* Steud., *Dictamnus gymnostylis* Steven, *Galium mollugo* L. and *Philadelphus caucasicus* Koehne (Dudka et al., 2004), from United States on *Actaea* sp., *Castilleja pallida* (L.) Spreng., *Helenium hoopesii* A. Gray and *Scrophularia parviflora* Wootton & Standl. (Cooke, 1985, Conners, 1967). *Leptosphaeria modesta* is reported for the first time from Turkey.

Ophiobolus erythrosporus has got a broad host range. It is found on *Achillea* sp., *Aster macrophyllus* L., *Marrubium vulgare* L., *Solanum tuberosum* L. and *Solidago* sp. in Canada (Ginns, 1986), on *Centaurea* sp., *Lamium maculatum* L. and *Urtica dioica* L. in Germany (Schmid-Heckel, 1988), on *Cirsium* sp. in Pakistan (Ahmad, 1997), on *Scrophularia lanceolata* Pursh and *Urtica* sp. in United Kingdom (Shoemaker, 1976, Cannon et al., 1985), on *Senecio campestris* DC. in Russia (Babuschkina, 1995), on *Urtica dioica* L. in Denmark and Poland (Munk, 1957, Mulencko et al., 2008) and on *Urtica* sp. in England (Dennis, 1981). *Ophiobolus erythrosporus* is reported for the first time from Turkey.

References

- Ahmad S., Iqbal S.H., Khalid A.N., *Fungi of Pakistan*. Sultan Ahmad Mycological Society of Pakistan, Department of Botany, University of Punjab, Quaid-e-Azam Campus, Lahore(1997).
- Aktaş H., Bostancıoğlu H., Tunalı B., Bayram E., *Sakarya Yöresinde Buğday Kök ve Kök Boğazı Çürüklüğüne Neden Olan Hastalık Etmenlerinin Belirlenmesi ve Bu Etmenlerin Buğday Yetiştirme Teknikleri ile İlişkileri Üzerinde Araştırmalar*, Bitki Koruma Bülteni, 36(3-4)151-167(1996).
- Ariyawansa H.A., Phukhamsakda C., Thambugala K.M., Bulgakov T.S., Wanasinghe D.N., Perera R.H., Mapook A., Camporesi E., Kang J.C., Jones E.B.G., Bahkali A.H., Jayasiri S.C., Hyde K.D., Liu Z.Y., Bhat, D.J., *Revision and Phylogeny of Leptosphaeriaceae*, Fungal Diversity, 74, 19-51(2015).
- Babuschkina I.N., *Ad Floram Ascomycetum Reservati Svirensis Inferioris Notula*, Novosti Sist. Nizsh. Rast., 30, 16-18(1995).
- Baydar S., *Erzurum, Erzincan ve Gümüşhane İllerinde Bitkilerden Toplanan Ascomycetes Fungusları Üzerinde Araştırmalar*, Atatürk Üniv. Fen Fakültesi Yayınları, Erzurum(1975).



- Baydar S., *Trabzon ve Rize İllerinin (Ascomycetes) Fungus Türleri*, Atatürk Üniv. Fen Fakültesi Dergisi, 1(1)250-281(1982).
- Cannon P.F., Hawksworth D.L., Sherwood-Pike M.A., *The British Ascomycotina. An Annotated Checklist*, Commonwealth Mycological Institute, Kew(1985).
- Connors I.L., *An Annotated Index of Plant Diseases in Canada and Fungi Recorded on Plants in Alaska, Canada and Greenland*, Canadian Department of Agriculture, Ottawa(1967).
- Cooke W.B., *The 1980 Arizona Foray*. Mycologia 77(1)168-171(1985).
- Crane J.L., Shearer C.A., *A Nomenclator of Leptosphaeria V. Cesati & G. de Notaris (Mycota- Ascomycotina- Loculoascomycetes)*, Bulletin Illinois Natural History Survey, 34(3)195-355(1991).
- Davis P.H., *Flora of Turkey and the East Aegean Island, Vol. 1-9*, Edinburgh Univ. Press., Edinburgh(1965-1985).
- Dennis R.W.G., *British Ascomycetes*. J. Cramer, Vaduz(1981).
- Dudka I.O., Heluta V.P., Tykhonenko Y.Y., Andrianova T.V., Hayova V.P., Prydiuk M.P., Dzhanagan V.V., Isikov V.P., *Fungi of the Crimean Peninsula*, M.G. Kholodny Institute of Botany, Ukraine(2004).
- Ellis B.M., Ellis J.P., *Microfungi on Land Plants*, Croom Helm, London-Sydney(1987).
- Erdoğan M., Hüseyin E., *Microfungi of Kurtboğazi Dam (Ankara) and its Environment*, Ot Sistematik Botanik Dergisi, 14(1)131-150(2008).
- Ginns J.H., *Compendium of Plant Disease and Decay Fungi in Canada 1960-1980*, Canadian Government Publishing Centre, Ottawa(1986).
- Göbelez M., *La Mycoflore de Turquie, I*, Mycopathologia et Mycologia Applicata, 19(4)296-314(1963).
- Karel G.A., *Preliminary List of Plant Diseases in Turkey*, Ayyıldız Matbaası, Ankara(1958).
- Mulenko W., Majewski T., Ruszkiewicz-Michalska M., *A Preliminary Checklist of Micromycetes in Poland*, W. Szafer Institute of Botany, Polish Academy of Sciences, Poland(2008).
- Munk A., *Danish Pyrenomycetes. A Preliminary Flora*, Dansk Botanisk Arkiv, 17(1)1-491(1957).
- Muskett A., Malone J., *Catalogue of Irish Fungi - IV. Ascomycotina*, Proceedings of the Royal Irish Academy. Section B: Biological, Geological, and Chemical Science, 83(B)151-213(1983).
- Petrak F., *Neue Beiträge zur Pilzflora der Türkei*, Sydowia, 7(1-4)14-44(1953).
- Petrak F., *Beiträge zur Österreichischen Pilzflora*, Sydowia, 13(1-6)67-86(1959).
- Schmid-Heckel H., *Pilze in den Berchtesgadener Alpen*, Forschungsberichte aus dem Nationalpark Berchtesgaden, 15, 1-136(1988).
- Selçuk F., Gündoğan T., Akata I., *A New Record of Ophiobolus Riess for Turkey*, Communications Faculty of Sciences University of Ankara, 25(1-2)1-6(2016).
- Selçuk F., Hüseyin E., Cebeci C.C., *Juglans regia L. Mikromikotası İçin Yeni Kayıtlar*, XII. Ulusal Ekoloji ve Çevre Kongresi, 14-17 Eylül 2015, Bildiri Özetleri Kitabı, s. 115, Muğla(2015).
- Shoemaker R.A., *Canadian and Some Extralimital Ophiobolus Species*, Canadian Journal of Botany, 54, 2365-2404(1976).
- Tai F.L., *Sylloge Fungorum Sinicorum*, Science Press, Academica Sinica, Peking(1979).
- Unamuno P.L.M., *Enumeracion y distribución geografica de los ascomicetos de la Peninsula Iberica y de las Islas Baleares*, Memorias de la Real Academia de Ciencias, Madrid(1941).
- Walker J., *Gaeumannomyces, Linocarpon, Ophiobolus and Several Other Genera of Scolecospored Ascomycetes and Phialophora Conidial States, with a Note on Hyphopodia*, Mycotaxon, 11(1)1-129(1980).
- Wehmeyer L.E., *Some Himalayan Ascomycetes of the Punjab and Kashmir*, Mycologia, 55(3)309-336(1963).



***Bovista plumbea* Pers.'nin Yağ Asiti İçeriklerinin İncelenmesi**

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Öz: Bu çalışmada halk arasında puf mantarı olarak bilinen ve çeşitli bölgelerden toplanan *Bovista plumbea* Pers. türünün yağ asit kompozisyonları incelenmiştir. İncelenen türe ait yağ asit kompozisyonlarında oran olarak en fazla heneikosanoik asit (C21:0), eikosenoik asit (C20:1), behenik asit (C22:0), vaksenik asit (C18:1), linoleik asit (C18:2) ve linolenik asit (C18:3) izomerleri tespit edilmiştir.

Anahtar kelimeler: Makrofungus, *Bovista plumbea*, Yağ asiti, Ekstraksiyon.

Determination of Fatty Acid Contents of *Bovista plumbea* Pers.

Abstract: In this study, fatty acid compositions of *Bovista plumbea* Pers., known as puffball mushrooms and collected from different localities, were examined. In the fatty acid compositions of the examined species, the ratio is at most heneicosanoic acid (C21:0), eicosenoic acid (C20:1), behenic acid (C22:0), vaccenic acid (C18:1), linoleic acid (C18:2), and linolenic acid (C18:3) isomers.

Key words: Macrofungus, *Bovista plumbea*, Fatty acid, Extraction..

Giriş

Yağların insan sağlığı bakımından önemli etkileri bulunmaktadır. Özellikle de doymamış yağ asitlerinin etkileri önem arz etmektedir ve bu yağlar metabolizma tarafından sentezlenmediği için diyet olarak alınması gerekmektedir. Ayrıca unutulmaması gereken bir nokta da yağların karbonhidratlardan sonra enerji elde edilen önemli kaynaklar olduğudur.

Günümüzde diyet olarak kullanılan birçok besin maddesinin insan vücudu için gerekli yağ asitlerine sahip oldukları birçok çalışma ile ortaya konulmuştur. Bu besin maddeleri içerisinde yer alan mantarlar, özellikle Avrupa ve Uzak Doğu ülkelerinde sıklıkla tüketildiği görülmektedir. Ülkemizde ise, yapılan çalışmalarda ortaya konulan çok sayıda mantar türü bulunmasına ve önemli derecede

besleyicilik özellikleri olmasına rağmen besin olarak yeterince tüketilmediğini görmekteyiz (Doğan ve Ark., 2007; Servi ve ark. 2010; Sesli ve Denchev, 2014; Kaya 2015; Demirel ve Ark. 2016). Bu ve benzer çalışmalar ile mantarların faydalı yönleri ortaya çıkarılarak, halkımızın diyet olarak tüketmesine katkı yapılması amaçlanmaktadır (Aktümsek ve ark. 1998; Longvah ve Deosthale 1998; Diez ve ark. 2001; Yılmaz ve ark. 2006; Çolak ve ark. 2009; Riberio ve Ark. 2009; Kaşık ve Ark. 2013; Yılmaz ve ark. 2016).

Materyal ve Metot

Çalışma materyalini 2012-2017 tarihleri arasında Afyon, Konya (Akşehir, Kadınhanı, Beyşehir), Bolu illerinden toplanan örnekler oluşturmaktadır.