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Research Article

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 eritrosporus* (Riess) G. Winter ve *Leptosphaeria modesta* (Desm.) Rabenh. Türkiye mikobiyotası için yeni kayıttır. Bu türlerin ayırt edici morfolojik karakterleri tanımlanmış ve fotografları 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 scolecosporous 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 transfered 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.(Erdoğdu and Hüseyin,2008),*L. lusitanica*

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Thüm. on *Spartium junceum* L. and *L. tolgorensis* Petr. on *Euphorbia* sp. (Petrak, 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, occasionaly 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).

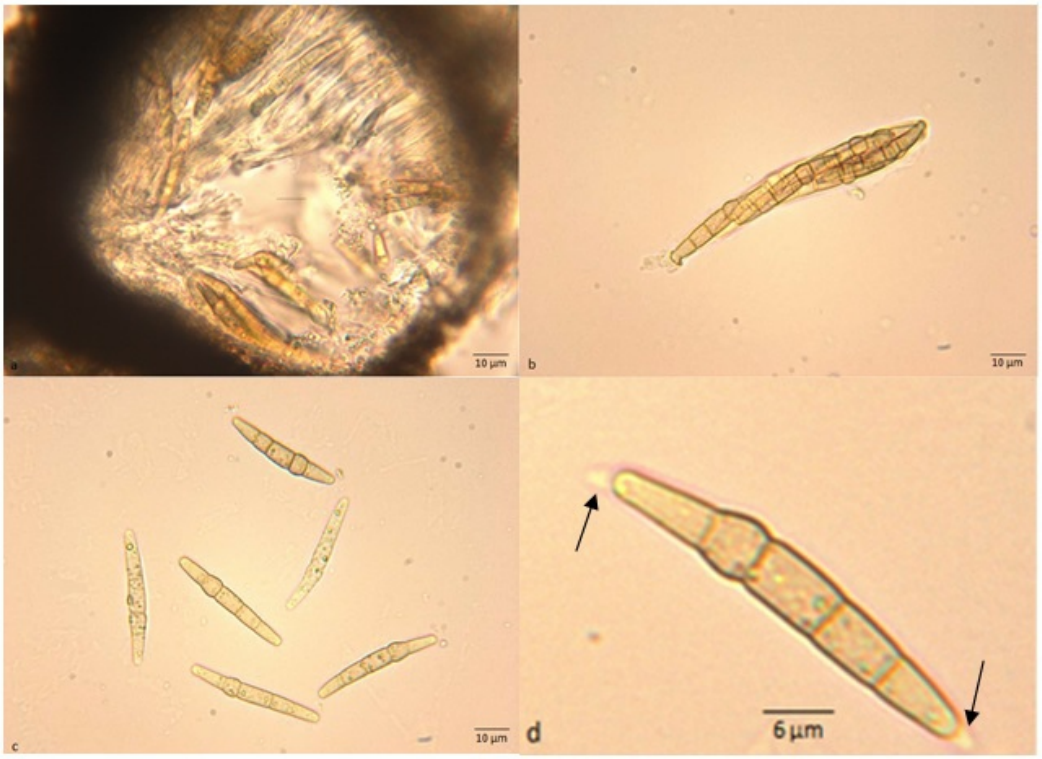

Figure 1. *Leptosphaeria modesta*: a. vertical section of an ascoma, b. ascus, c. ascospores, d. ascospore with hyaline appendage.

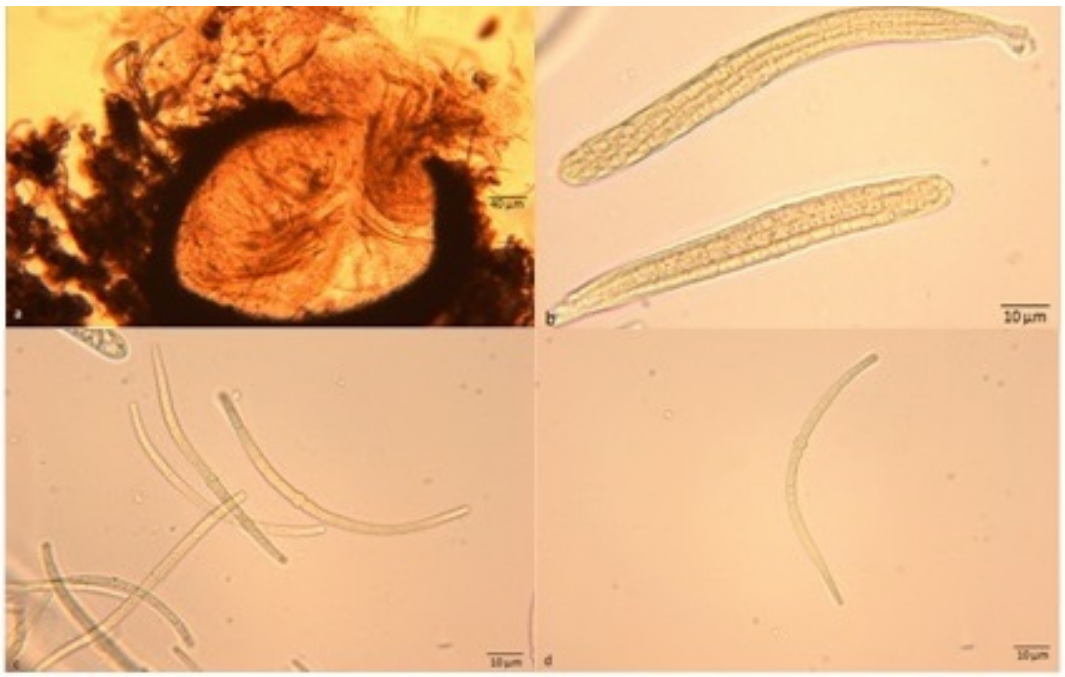

Figure 2. *Ophiobolus erythrosporus*:a. vertical section of an ascoma, b. asci, c. ascospores, d. ascospore.

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 (Petrak, 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. (Mulenko 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* Wooton & 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, Mulenko et al., 2008) and on *Urtica* sp. in England (Dennis, 1981). *Ophiobolus erythrosporus* is reported for the first time from Turkey.

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