



## First record of *Phaeoseptoria* and new species records on *Carex* for Turkey

Erdoğan M<sup>1\*</sup>, Özbek MU<sup>2</sup>

<sup>1</sup>Ahi Evran University, Arts and Sciences Faculty, Department of Biology, Kırşehir, Turkey

<sup>2</sup>Gazi University, Faculty of Science, Department of Biology, Ankara, Turkey

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### Abstract

*Phaeoseptoria caricicola* and *Septoria caricis*, which have been recently discovered on living leaves of *Carex divulsa* in Turkey, are new records for the country. *Phaeoseptoria* is recorded as a new genus for Turkey. Distinguishing morphological characters are described and illustrated for each species.

**Key words** – microfungi – *Phaeoseptoria caricicola* – *Septoria caricis*

### Introduction

*Carex* L. consists of over 2,000 species distributed worldwide and displaying high species diversity in temperate latitudes of the northern hemisphere (Reznicek 1990). The genus is represented by 116 taxa (100 species, 14 subspecies and 2 varieties) in Turkey (Ekim 2012). Some species of microfungi on several *Carex* species have been reported in Turkey—*Anthracoidea caricis* (Pers.) Bref. (as *Cintractia caricis* (Pers.) Magnus) (Erdoğan & Hüseyin 2008), *A. subinclusa* (Körn.) Bref. (Kırbağ 2003), *Lophodermium caricinum* (Roberge ex Desm.) Duby (as *Leptostroma caricinum* Fr.) (Tamer et al. 1989), *Puccinia caricicola* Fuckel, *P. caricina* DC., *P. dioicae* Magnus and *Puccinella caricis-sempervirentis* (E. Fisch.) Syd. (as *Uromyces caricis-sempervirentis* E. Fisch.) (Bahçecioğlu & Kabaktepe 2012). Recently, two fungi *Phaeoseptoria caricicola* (Sacc.) R. Sprague and *Septoria caricis* Pass., not previously reported from Turkey, were found on *Carex*.

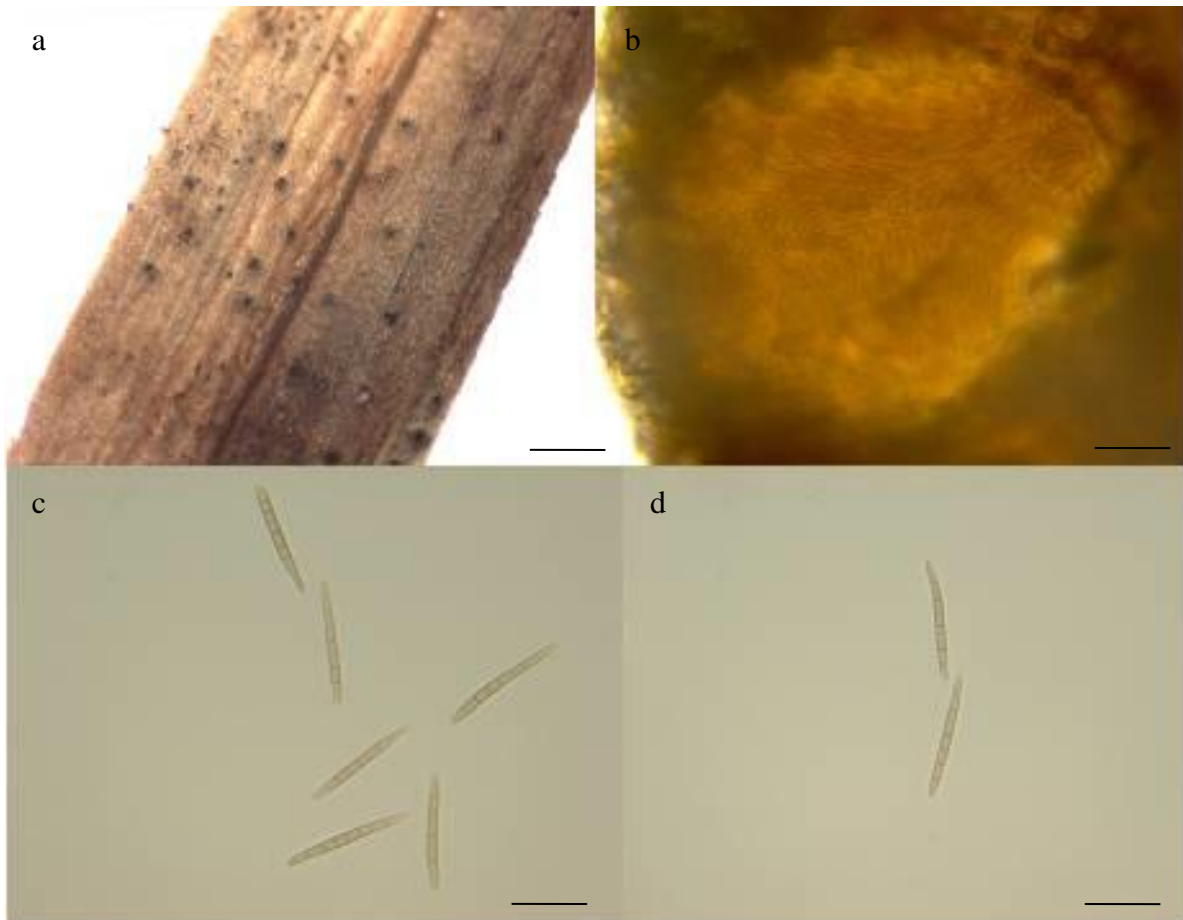
*Phaeoseptoria* Speg. is based on *Phaeoseptoria papayae* Speg., which was first described by Spegazzini (1908) on leaves of *Carica papaya* L. Spegazzini (1908) indicated that *Phaeoseptoria* is distinguished from *Septoria* by the olivaceous spores. The genus *Phaeoseptoria* and the species *P. caricicola* are reported for the first time from Turkey.

*Septoria* Sacc. represents a genus of plant pathogenic fungi with a wide geographic distribution, commonly associated with leaf spots and stem cankers of a broad range of plant hosts (Quaedvlieg et al. 2013). The genus *Septoria* is extremely large, and during the past 150 years more than 2,000 taxa have been ascribed to this asexual genus (Verkley & Starink-Willems 2004). Over 20 species of *Septoria* have been recorded on *Carex* spp. in the literature (Oudemans 1919, Grove 1935, Sprague 1954, Mankin 1969, Shaw 1973, Mathur 1979, Tai 1979, Punithalingam 1988, Vanev et al. 1997, Mel'nik et al. 2008, Farr & Rossman 2017).

The current study deals with two microfungi species collected from Muğla province and reports them for the first time in Turkey.

### Materials & Methods

Plant specimens infected with microfungi were collected from Muğla 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 1985). The fungi were examined using a Leica DM E light microscope. Mountings in tap water were used for measurements. Close-up photographs of infected host surface were done via a Leica EZ4D stereomicroscope. The fungi were identified using relevant literature (Grove 1935, Ellis & Ellis 1987 Vanev et al. 1997). 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 Mehmet Ufuk ÖZBEK (M.U. Özbek).



**Fig 1** – *Phaeoseptoria caricicola*, microscopic characteristics. a, General appearance of infected leaf. b, Vertical section of a pycnidium. c, d Conidia. – Scale bars a = 1 mm, b = 25  $\mu$ m, c, d = 20  $\mu$ m.

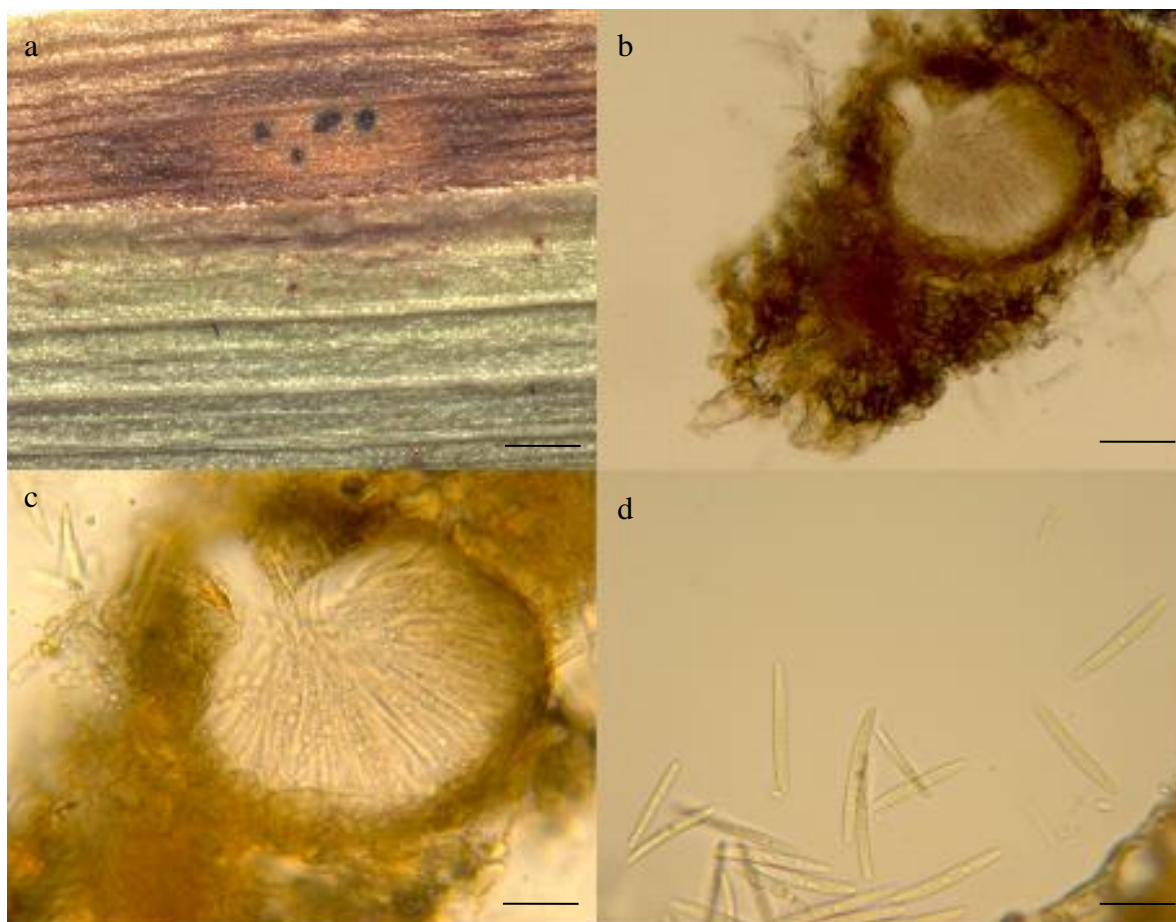
### Results

#### *Phaeoseptoria caricicola* (Sacc.) R. Sprague

Fig. 1

Leaf spots orbicular to irregular, 3–5 mm diam., ochraceous, spot margin brown, later leaves become brown. Conidiomata pycnidial, hypophyllous, immersed, becoming erumpent, globose, unilocular, 120–130  $\mu$ m diam., dark brown. Conidia cylindrical, fusiform, attenuate at both ends, 4–8-septate, mostly 7-septate, not constricted at septa, 32–39  $\times$  2.8–3.3  $\mu$ m, olivaceous.

Material examined – Turkey, Muğla, Yatağan, around Kapubağ Village, on living leaves of *Carex divulsa* Stokes, under *Pinus brutia* forest, 15 May 2014, 600 m alt., M.U. Özbek 2932.



**Fig 2** – *Septoria caricis*, microscopic characteristics. a, General appearance of infected leaf. b, c Vertical section of a pycnidium. d, Conidia. – Scale bars a = 0.8 mm, b = 40  $\mu$ m, c = 25  $\mu$ m, d = 20  $\mu$ m.

***Septoria caricis* Pass.**

Fig. 2

Leaf spots orbicular or irregular, 2–6 mm diam., pale brown or ochraceous, spot margin brown. Conidiomata pycnidial, hypophyllous, mostly on dead tips of living leaves, immersed, becoming erumpent, globose, unilocular, 70–120  $\mu$ m diam., dark brown. Conidia cylindrical, fusiform, obtuse at both ends, 1–3-septate, mostly 3-septate, not constricted at septa, guttulate, 25–30  $\times$  2.7–3.9  $\mu$ m, hyaline.

Material examined – Turkey, Muğla, Yatağan, around Kapubağ Village, on living leaves of *Carex divulsa*, under *Pinus brutia* forest, 15 May 2014, 600 m alt., M.U. Özbek 2932.

**Discussion**

Three species of *Phaeoseptoria* have been recorded on *Carex* spp. worldwide. These are *Phaeoseptoria caricicola*, *P. caricis* Tehon & E.Y. Daniels and *P. festucae* R. Sprague. The conidia of *P. caricis* are long, cylindrical, one end acute, 70–80  $\times$  7  $\mu$ m and are 7–10 septate. In *P. festucae*, the conidia are clavate-filiform, 50–85  $\times$  2.8–4.8  $\mu$ m and are 8–11 septate. *Phaeoseptoria caricicola* is distinguished from other species on *Carex* in having elongate-cylindrical, curved or flexuous conidia that are 35–55  $\times$  4  $\mu$ m and 7-septate (rarely 6 or 8) (Grove 1935, Ellis & Ellis 1987). Conidia of this fungus in Turkey are slightly narrower and shorter than reported in the literature.

The genus *Phaeoseptoria* and *P. caricicola* are reported for the first time from Turkey. This fungus was previously known from USA on *Carex atherodes* Spreng., *C. nebrascensis* Dewey and *C. praticola* Rydb. (Sprague 1955, 1958, 1962), from Poland on *C. acutiformis* Ehrh., *C. arenaria* L., *C. flava* L., *C. gracilis* Ehrh. and *C. riparia* Curtis (Mulencko et al. 2008), and from India on *Melica cupani* Guss. (Mathur 1979).

The genus *Septoria* is one of the largest genera of plant pathogens, causing a range of disease symptoms including leaf and fruit spots in many agricultural crops, as well as horticultural and native plants (Holliday 1989). *Septoria caricis* is a common species on *Carex* throughout the world (Farr & Rossman 2017). From our observations, the species seems to be a weak parasite, occurring on dead leaf tips. *Septoria caricis* is reported for the first time from Turkey.

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### References

- Bahçecioğlu Z, Kabaktepe Ş. 2012 – Checklist of rust fungi in Turkey. Mycotaxon 119, 494 (Link page).
- Davis PH. 1985 – Flora of Turkey and East Aegean Islands Vol. 9. Edinburgh University Press, Edinburgh.
- Ekim T. 2012 – *Carex*. In: Güner A, Aslan S, Ekim T, Vural M, Babaç MT. (eds). Türkiye Bitkileri Listesi (Damarlı Bitkiler). Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmaları Derneği Yayını, İstanbul.
- Ellis BM, Ellis JP. 1987 – Microfungi on Land Plants. Croom Helm, Sydney, Australia.
- Erdoğan M, Hüseyin E. 2008 – Microfungi of Kurtboğazı Dam (Ankara) and its environment. Ot Sistematik Botanik Dergisi 14(1), 131–150.
- Farr DF, Rossman AY. 2017 – Fungal databases, systematic mycology and microbiology laboratory, ARS, USDA. Retrieved September 30, 2017, <https://nt.ars-grin.gov/fungaldatabases/>
- Grove WB. 1935 – British Stem-and Leaf Fungi. Coelomycetes Vol. 1. University Press, Cambridge.
- Holliday PA. 1989 – Dictionary of Plant Pathology. Cambridge University Press, Cambridge.
- Kırbağ S. 2003 – Two new records for the mycoflora of Turkey. Turkish Journal of Botany 27, 153–154.
- Mankin CJ. 1969 – Fungous diseases on non-grass plants in South Dakota. Agricultural Experiment Station Technical Bulletins 36, 1–28.
- Mathur RS. 1979 – The Coelomycetes of India. Bishen Singh Mahendra Pal Singh, Delhi, India.
- Mel'nik VA, Shabunin DA, Popov ES. 2008 – Contributions to the studies of mycobiota in Novgorod and Pskov regions. II. Coelomycetes. Mikologiya I Fitopatologiya 42, 43–52.
- Mulencko W, Majewski T, Ruskiewicz-Michalska M. 2008 – A Preliminary Checklist of Micromycetes in Poland Vol. 9. W. Szafer Institute of Botany, Polish Academy of Sciences, Poland.
- Oudemans CAJA. 1919 – Enumeratio Systematica Fungorum Vol. I. M. Nijhoff, Den Haag.
- Punithalingam E. 1988 – *Ascochyta* II. Species on monocotyledons (excluding grasses), cryptogams and gymnosperms. Mycological Papers 159, 1–235.
- Quaedvlieg W, Verkley GJM, Shin H-D, Barreto RW, Alfenas AC, Swart WJ, Groenewald JZ, Crous PW. 2013 – Sizing up *Septoria*. Studies in Mycology 75, 307–390.
- Reznicek AA. 1990 – Evolution in sedges (*Carex*, Cyperaceae). Canadian Journal of Botany 68, 1409–1432.

- Shaw CG. 1973 – Host fungus index for the Pacific Northwest - I. Hosts. Washington State University, Washington Agricultural Experiment Station Bulletin 765, 1–121.
- Spegazzini C. 1908 – Fungi aliquot Paulistani. *Revista del Museo de La Plata* 15, 7–48.
- Sprague R. 1954 – Some fungi on Alaskan species of *Carex*. *Research Studies. State College of Washington* 22, 161–178.
- Sprague R. 1955 – A check list of fungi of Glacier Bay, Alaska. *Research Studies. State College of Washington* 23, 202–224.
- Sprague R. 1958 – Some fungi on western species of Cyperaceae. *Research Studies. State College of Washington* 26, 74–84.
- Sprague R. 1962 – Some fungi on western species of Cyperaceae. II. *Research Studies. State College of Washington* 30, 45–63.
- Tai FL. 1979 – *Sylloge Fungorum Sinicorum*. Science Press, Academica Sinica, Peking.
- Tamer AÜ, Altan, Y, Gücin F. 1989 – Gülveren köyü (Erzurum-Şenkaya) florasında belirlenen bazı parazit funguslar. *Anadolu Üniv. Fen-Edebiyat Fak. Dergisi* I(2), 45–55.
- Vanev SG, Sameva EF, Bakalova GG. 1997 – *Fungi Bulgaricae*, Vol. 3(1). Pensoft Publication, Sofia.
- Verkley GJM, Starink-Willemse M. 2004 – A phylogenetic study of some *Septoria* species pathogenic to Asteraceae based on ITS ribosomal DNA sequences. *Mycological Progress* 3, 315–322.