

## First report of *Cercospora helianthicola* and *Septoria helianthina* on *Helianthus annuus* in Austria

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Angenommen am 16. Oktober 2020. © Austrian Mycological Society, published online 21. October 2020

VOTZI, J., BEDLAN, G., 2020: First report of *Cercospora helianthicola* and *Septoria helianthina* on *Helianthus annuus* in Austria. – Österr. Z. Pilzk. 28: 63–67.

**Key words:** *Ascomycota*, new record, leaf spot diseases, sunflower, *Helianthus annuus*.

**Zusammenfassung:** Im Juli 2018 wurden die Blattfleckenpilze *Cercospora helianthicola* und *Septoria helianthina* an Blättern der Sonnenblume, *Helianthus annuus*, in Österreich nachgewiesen. Dies ist der erste Nachweis dieser Pilzarten an Sonnenblume in Österreich.

**Abstract:** In July 2018, the plant pathogenic fungal species *Cercospora helianthicola* and *Septoria helianthina* were detected on leaves of sunflower, *Helianthus annuus*, in Austria. This is the first report of these species on sunflower for Austria.

Sunflower, *Helianthus annuus* L., is one of the most important oil seed crops in Austria. In 2018, the total Austrian cultivation area of sunflower reached 21.504 ha next to oil pumpkin (23.241 ha), rapeseed (40.504 ha) and soybean (67.624 ha). The main cultivation areas are Lower Austria, Burgenland and Styria (STATISTIK AUSTRIA 2019).

Austrian sunflower production has to deal with several plant pathogenic fungal species (BERGER & al. 1999). In July 2018, in the course of a monitoring of fungal infectious agents on sunflower in Austria, numerous circular to irregular-shaped, brown, necrotic leaf spots were detected in a sunflower crop in Styria. These spots were spread over the entire lamina, in part leading to large-area necrosis (Fig. 1).

A number of plant pathogenic fungi have been reported to cause leaf spots on sunflower (*Helianthus* spp.), including five *Cercospora* FRESEN. ex FÜCKEL and five *Septoria* SACC. species, viz. *Cercospora apii* FRESEN., *C. bidentis* THARP., *C. helianthi* ELLIS & EVERH., *C. helianthicola* CHUPP & VIÉGAS, *C. pachypus* ELLIS & KELLERM., *Septoria helianthi* ELLIS & KELLERM., *S. helianthicola* COOKE & HARKN., *S. helianthina* M. PETROV & ARSEN., *S. inulae* SACC. & SPEG. and *S. pauper* ELLIS (Tabs. 1, 2) (BRANDENBURGER 1985, FARR & ROSSMAN 2020, GIBF.ORG 2020, HARVESON & al.

2016, PETROV & ARSENIJEVIĆ 1996). *Cercospora helianthi* and *C. pachypus* are now placed in the genus *Passalora* FR. as *Passalora helianthi* (ELLIS & EVERH.) U. BRAUN & CROUS and *P. pachypus* (ELLIS & KELLERM.) U. BRAUN (BRAUN 1999, CROUS & BRAUN 2003). In Austria, only *S. helianthi* is presently known to occur (GIBF.ORG 2020). The following report describes and illustrates two species on *Helianthus annuus* so far unknown for Austria, namely *S. helianthina* and *C. helianthicola*.

Tab. 1. Morphological characteristics of the conidia of *Septoria* species reported from *Helianthus* spp.

Species	Length (µm)	Width (µm)	No. of septa	Reference
<i>Septoria helianthi</i>	30–70	2–3	3–5	ELLIS & KELLERMAN (1883)
<i>Septoria helianthicola</i>	30–35	1	- *)	COOKE & HARKNESS (1880)
<i>Septoria helianthina</i>	10–50	1–3	0–5	PETROV & ARSENIJEVIĆ (1996)
<i>Septoria inulae</i>	30–50	3–4	1	SACCARDO (1878)
<i>Septoria pauper</i>	45–55	1–1,5	3–7	MARTIN (1887)

\*) No mention of number or presence of septa in the protologue.

Tab. 2. Morphological characteristics of the conidia of *Cercospora* species reported from *Helianthus* spp.

Species	Length (µm)	Width (µm)	No. of septa	Reference
<i>Cercospora apii</i>	33–166	- *)	3–11	FRESENIUS (1863)
<i>Cercospora bidentis</i>	45–150	3–4	0	THARP (1917)
<i>Cercospora helianthicola</i>	40–120	1,5–3	- **)	VIÉGAS (1945)
<i>Passalora helianthi</i>	70–110	5–6	3–6	CROUS & BRAUN (2003), ELLIS & EVERHART (1887)
<i>Passalora pachypus</i>	25–70	5–7	1	BRAUN (1999), ELLIS & KELLERMAN (1887)

\*) No mention of width of conidia in the protologue.

\*\*\*) No mention of number of septa in the protologue. The corresponding figure illustrates conidia with 3–9 septa.

## Material and methods

Light microscopy (Olympus BX53) has been used for identification purposes of the causal agents of leaf spots found on sunflower in Austria. The fungal structures were stained by Wittmann's blue (WITTMANN 1970). The programme 'cellSens' (Ver.1.18) of Olympus was used for measurements (n=100). Voucher specimens are deposited at W (Cryptogamic Herbarium, Natural History Museum, Vienna, Austria): Austria, Styria, district Weiz, Gleisdorf, N 47° 05' 20", E 15° 39' 45", on living leaves of *Helianthus annuus*, 17. July 2018, leg. JULIA VOTZI, det. JULIA VOTZI & GERHARD BEDLAN (*Septoria helianthina* = W 0102808, *Cercospora helianthicola* = W 0102809).

## Results and discussion

Small, circular, light brown to greyish spots with a dark brown margin, in part surrounded by a yellowish halo, were detected. In the necrotic tissue of diseased sunflower leaves brown, globose to subglobose pycnidia appeared. They were formed singly or in groups on the upper side of the leaf and released hyaline, filiform, curved conidia with the basal end obtuse and the apical end slightly pointed (Fig. 2). The conidia are 1–5-celled, 16.5–50 × 1–3 µm in size, on average 30 × 1.8 µm (n= 100). The conidiogenous

cells are hyaline and pyriform. Based on the microscopical characteristics this species was identified as *Septoria helianthina* (Tab. 1).



Fig. 1. Multiple infection symptoms of *Septoria helianthina* and *Cercospora helianthicola* on a leaf of *Helianthus annuus*.

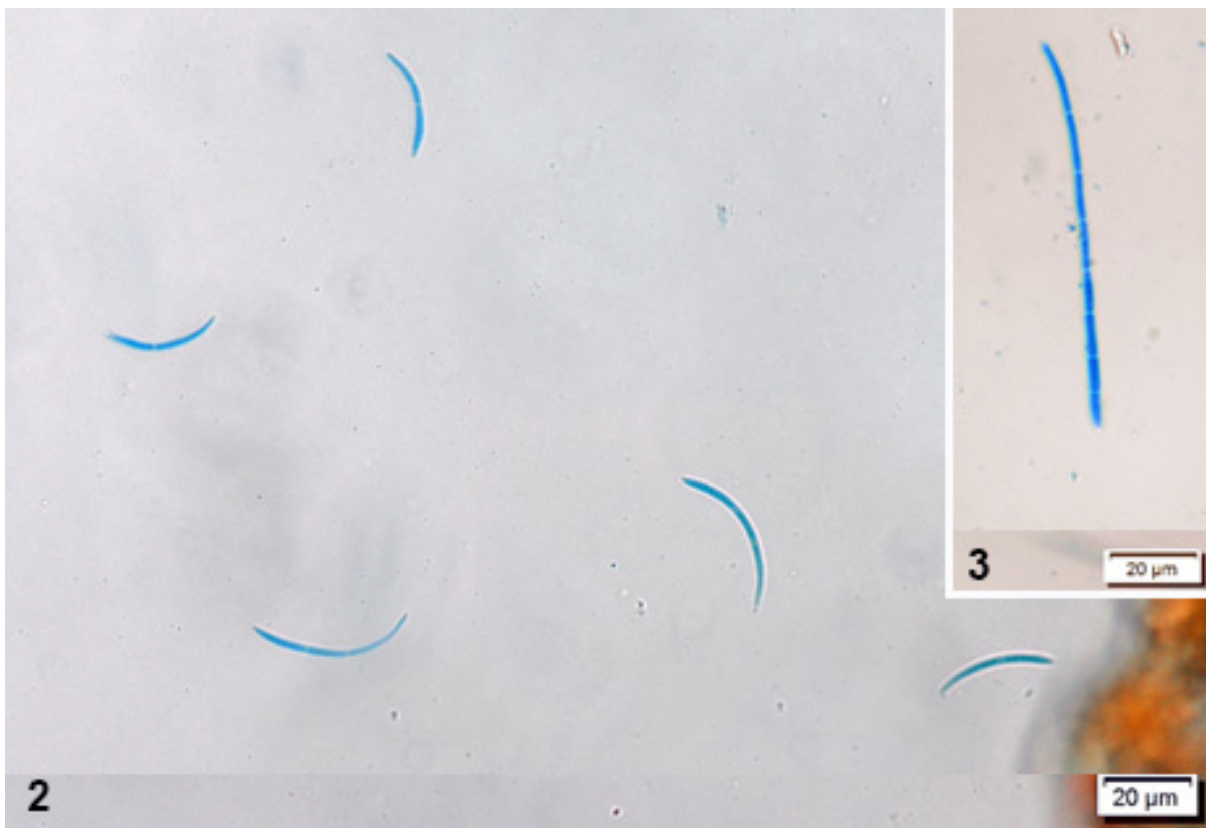


Fig. 2. Conidia of *Septoria helianthina*, stained with Wittmann's blue. – Fig. 3. Conidium of *Cercospora helianthicola*, stained with Wittmann's blue.

Moreover, irregular to roundish, brown leaf spots were observed on both sides of the sunflower leaves. Fasciculate (1–9), septate and simple to branched conidiophores emerge through stomata on the necrotic leaf tissue. The latter are light brown and give rise to hyaline, acicular, septate (3–11) conidia. The conidia measure  $40\text{--}111 \times 1.7\text{--}3.2 \mu\text{m}$ , on average  $64 \times 2.6 \mu\text{m}$  ( $n=100$ ) (Fig. 3). Due to the microscopical characteristics, this species was identified as *Cercospora helianthicola* (Tab. 2).

It can be stated that two fungi found, *Septoria helianthina* and *Cercospora helianthicola*, are involved in leaf spots on sunflower collected in Styria, Austria. *Septoria helianthina* is so far only known from Serbia on *Helianthus annuus* (PETROV & ARSENIJEVIĆ 1996). *Cercospora helianthicola* was yet not known to occur in Europe (GIBF.ORG 2020). The latter is reported from Brazil, Cambodia, China, India, Japan, Mauritius, Pakistan, Samoa and Thailand on *Helianthus* spp. (FARR & ROSSMAN 2020, GIBF.ORG 2020). To our knowledge, the two species have not yet been recorded for Austria (FARR & ROSSMAN 2020, GIBF.ORG 2020).

*Septoria helianthi* occurs frequently in Austria and worldwide and is considered to be an economic important sunflower pathogen (BERGER & al. 1999, PETROV & ARSENIJEVIĆ 1996). In contrast, *S. helianthina* and *Cercospora helianthicola* were yet only reported from one sunflower field in Austria. Thus, further investigations are necessary to determine the occurrence of these pathogens in Austria and to assess their potential impact on the Austrian sunflower cultivation.

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