

## Seven little known species of the genus *Alternaria*

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The occurrence of seven little known *Alternaria* species (Fungi Imperfecti, Hyphomycetes, Dematiaceae) collected in the years 1969 to 1994 in the Czech Republic is reported and their morphological characteristics presented. They cover two species described by the author, *A. calendulae* (Ondřej 1974) and *A. thalictrina* (Ondřej 1974), a new combination: *A. anthyllidis* (Baudyš) Ondřej comb. nov. and three hitherto unknown species to the Czech Republic: (*A. helianthificiens* Simmons, *A. leucanthemi* Nelen, and *A. infectoria* Simmons). A new species *A. caricina* Ondřej spec. nov., is described from leaves of *Carex brizoides* L. Additional taxonomical characters (size of conidial scars) are given for each species.

**Key words:** *Alternaria* spp., *A. caricina* spec. nov., Czech Republic, taxonomy

Ondřej, M. (1996): Málo známé druhy hub rodu *Alternaria* – Czech Mycol. 49: 119–127

Je uveden výskyt sedmi málo známých druhů hub rodu *Alternaria* Nees z území ČR (Fungi imperfecti, Hyphomycetes, Dematiaceae) sbíraných v letech 1969 — 1994. Jedná se o druhy popsané autorem (*A. calendulae* Ondřej 1974, *A. thalictrina* Ondřej 1974), o novou kombinaci *A. anthyllidis* (Baudyš) Ondřej comb. nov. a o druhy nové pro území ČR (*A. helianthificiens* Simmons, *A. leucanthemi* Nelen, *A. infectoria* Simmons). Na listech *Carex brizoides* je popisován nový druh *A. caricina* Ondřej spec. nov. U jednotlivých druhů je uveden doplňující taxonomický znak (velikost basální konidiální jizvy).

The taxonomy of fungi from the genus *Alternaria* first reached a solid level after World War II thanks to Neergaard, who published a significant and fundamental study in 1945 including 18 species known at that time. The next step in the knowledge of the genus *Alternaria* was made by Joly in 1964, who mentioned 121 species. Further information enriching and deepening the insight into the taxonomy of the genus *Alternaria* was published by the following authors: Rao (1965, 1971, 1977) Joly (1969) and Simmons (1965, 1981, 1982, 1986). The recent extensive work on the genus *Alternaria* by Rotem (1994) does not deal with the taxonomy of the genus. In the Czech Republic a list of the collections of *Alternaria* species was published in 1974 by Ondřej, mentioning 16 species. As a result of further mycofloristic research the number of species known from the Czech Republic was extended to 31 (Ondřej 1990).

For the description and identification of *Alternaria* species formerly only differences in form and size of the conidia and in the number of septa were used.

Great significance was given to the association to a specific host or a group of hosts. So far however, no attention was paid to important taxonomical characters, such as the size of conidial scars and the dimension of basal conidial cells.

This paper aims at providing information on little and insufficiently known species of the genus *Alternaria* from the Czech Republic, and presenting additional taxonomical features of them.

***Alternaria anthyllidis* (Baudyš) Ondřej, comb. nov.**

Basionym: *Helminthosporium anthyllidis* Baudyš, Lotos, 63:103, 1915.

Baudyš placed this species into the genus *Helminthosporium* as a consequence of the absence of longitudinal septa. According to the original diagnosis the conidiophores are  $40-100 \times 5-7 \mu\text{m}$  in size and the conidia possess 2-7 transverse septa and measure  $35-80 \times 11-15 \mu\text{m}$ . A study of my own collections (Fig. 1) revealed the occasional occurrence of transverse septa and the formation of conidia in chains. Conidiophores with 1-5 scars,  $30-110 \times 5-8 (10) \mu\text{m}$ . Conidia with 1-13 transverse and rarely with 1-2 longitudinal septa, formed individually or in short chains,  $30-80 (90) \times 8-13 (15) \mu\text{m}$ . Conidial scars  $3,5-4,5 (5) \mu\text{m}$ , basal conidial cells  $10-13 (18) \times 8-10 \mu\text{m}$ , apical cells  $8-13 (18) \times 6-8 (9) \mu\text{m}$ .

Collections. Host: *Anthyllis vulneraria* L.

— Bohemia : Bohdánkov, July 1914 (Baudyš 1916), Kohoutovice, June 1915 (Baudyš 1916), Vrchovina u Libáně, Jičín, June 1915 (Baudyš 1916).

— Moravia : Pálava, 24 June 1959 (Ondřej PRC), Kralice n. Osl., 30 July 1970 (Ondřej BRA), Loučná n. Desnou, 9 Sep. 1981 (Ondřej, private herb.), Kralice n. Osl., 20 July 1985 (Ondřej, private herb.).

— Slovakia : Těrchová, Vrátna dolina, Janoškovy diery, 7 July 1978 (Ondřej BRA).

***Alternaria calendulae* Ondřej, Acta Musei Silesiae, Opava, Ser. A, XXIII: 150, 1974.**

Syn.: *Alternaria calendulae* Nirenberg, Phytopath. Z. 88:106-116, 1977

Species of the genus *Alternaria* parasitic on *Calendula officinalis* L. have long been known. Neergaard (1945) classified them under *Alternaria porri* (Ell.) Neerg. This opinion was accepted by Baker and Davis (1950), Joly (1964) and Pape (1964), though they mentioned morphological and physiological differences within the species. Nevertheless they did not designate a separate species. A probably identical taxon was described in Russia under the name of *Macrosporium calendulae* Nelen (Nelen and Vasiljeva, 1959), possessing the following conidium dimensions:  $190-290 \times 16-24 \mu\text{m}$ . The paper does however not contain a Latin

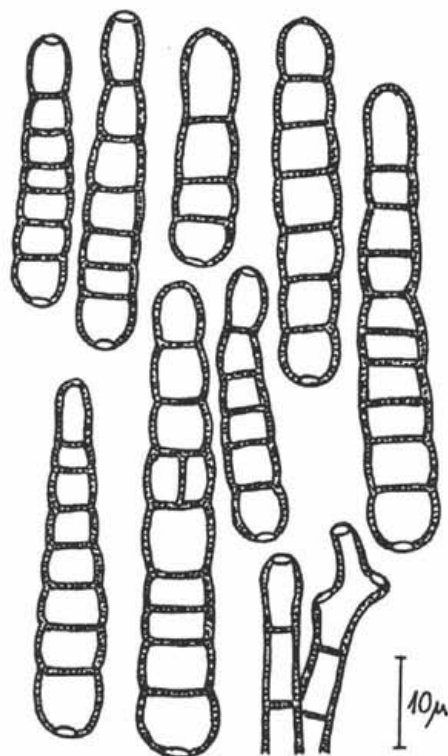


Fig. 1. *Alternaria anthyllidis* (Baudyš)  
Ondřej comb. nov.

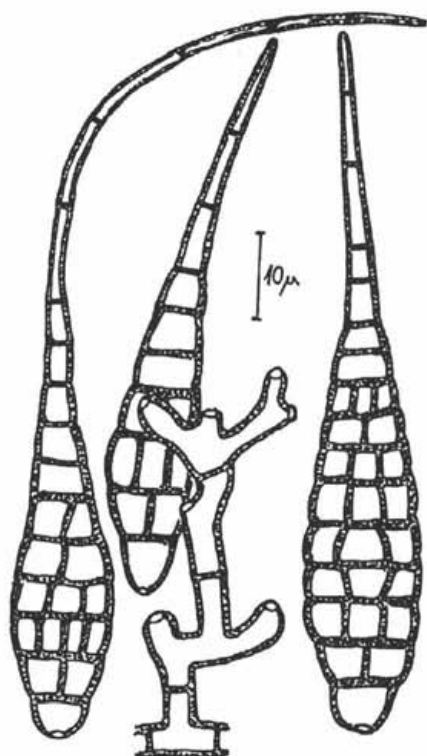


Fig. 2. *Alternaria calendulae* Ondřej

diagnosis nor information on the deposition of the type material, so that this name is invalid. Detailed research on the fungus was carried out in Germany (Nirenberg 1977), where it caused significant reduction in the germination as well as death of the plants in the course of their growth. In inoculation tests the pathogenicity of the species *A. porri* and *A. calendulae* infested on separate leaves was compared. The tests proved that they are two different species. Differences were also found on fertile agar substrates. *A. calendulae* differed in a tuft-like arrangement of the conidia on the conidiophores.

According to Nirenberg (1977) the conidiophores are coloured brown, lighter to top, often branched with 1-8 scars after the conidia have fallen off, and measure  $7-90 \times 5-8 \mu\text{m}$ . Conidia brown, reversely clavate with appendix,  $60-141 \times 15,5-42,0 \mu\text{m}$  (rostrum  $58-206 \times 2-6 \mu\text{m}$ ), with 5-12 transverse septa.

According to my own collections (Fig.2) the fungus forms large brown-black spots on leaves, which later fuse and cause the leaves to die off. It spreads from

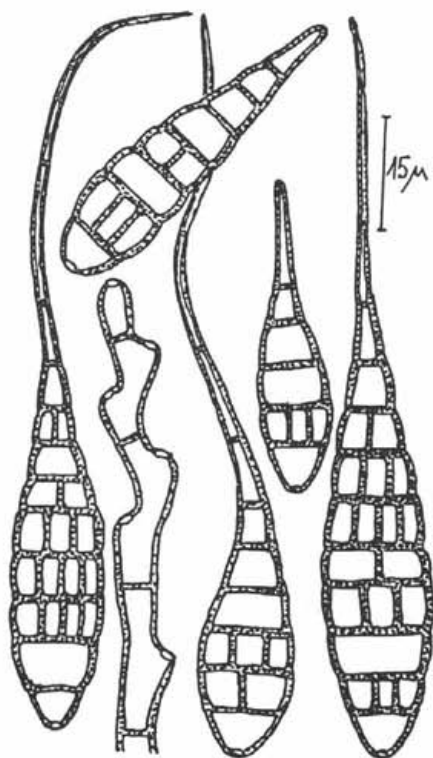


Fig. 3. *Alternaria helianthificiens* Simmons, Walcz et Roberts

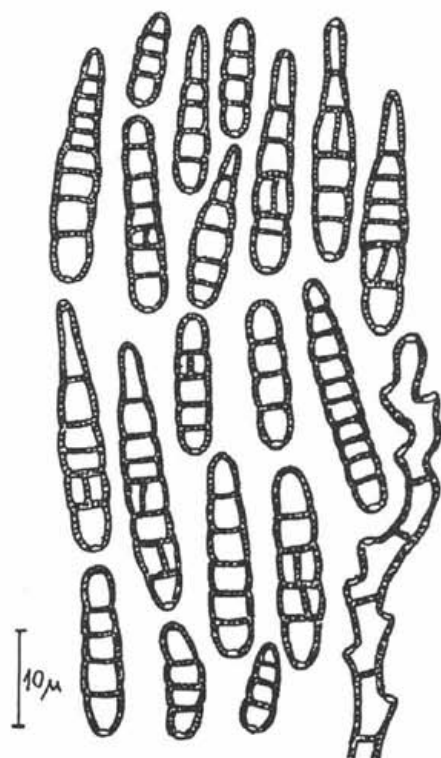


Fig. 4. *Alternaria infectoria* Simmons

the leaves onto the stalk. The septate conidiophores are brown-coloured, straight, unbranched or branched with branches measuring 20-50 (100)  $\times$  4-6 (8)  $\mu\text{m}$ . Conidia with long beaks, dark-coloured, not forming chains and measuring 80-250 (300)  $\times$  10-22 (30)  $\mu\text{m}$ . Number of transverse septa 8-15, number of longitudinal septa 2-13. Basal scars 2,5-3,5  $\mu\text{m}$  large. The dimensions of the conidiophores and conidia are variable and dependent on habitat. Conidia from shadowed sites are longer and narrower.

Collections. Host: *Calendula officinalis* L.

— Moravia: Libina, Šumperk district, 22 Aug 1970 (Type), Vikýřovice, Šumperk district, 8 Sep 1980, 26 Aug 1985 (Ondřej, private herb.)

Remark: the species was also collected by the author in Russia: Železnogorsk, 29 July 1982, and in Belarus: Žodino, Minsk 17 Aug 1983 (both collections in private herb.).

***Alternaria helianthificiens*** Simmons, Walcz et Roberts, Mycotaxon 25: 204, 1986.

This species (Fig. 3) forms brown-black, irregularly shaped and later merging spots on leaves and cause the leaves to die off. It spreads from the leaves onto the stalks, where it forms brown oblong spots. During ripening they pass on to the seeds. The conidiophores are brown coloured, septate,  $20-200 \times 5-7 \mu\text{m}$ . Conidia brown-coloured, with long beaks, formed individually,  $60-300 \times 12-18$  (22)  $\mu\text{m}$  in size, with 1-2 longitudinal septa. Basal scars  $2.5-3.5 \mu\text{m}$  large.

This taxon was described by Simmons in 1986 based on a comparative study of collections from the USA, Canada and Hungary. So far four different *Alternaria* species have been described from sunflowers. The most common and wide-spread is *A. helianthi* (Hanf.) Tub. et Nishik., which was described as early as 1943 under the name *Helminthosporium helianthi* Hansford. The occurrence of this species in the Czech Republic is very likely. It is closely related to *A. leucanthemi* Nelen.

Collections. Host: *Helianthus annuus* L.

— Moravia: Víkřovice, Šumperk district, 26 Aug 1985 (Ondřej, private herb.).

***Alternaria infectoria*** Simmons, Mycotaxon 25:298, 1986.

As a half-parasite this species (Fig. 4) is partly responsible for the drying up of leaves of several grass species (*Agrostis*, *Lolium*, *Festuca*, *Poa*). It often occurs together with *Alternaria alternata*. The conidiophores are brown-coloured, septate, dented after the conidia haven fallen off, and  $10-80$  (100)  $\times$   $2.5-4.5 \mu\text{m}$  large.

The brown coloured conidia are of different shapes (cylindrical, ovoid, reversely clavate), formed in branched chains, measure  $15-30$  (50)  $\times$   $7-10$  (11)  $\mu\text{m}$  and have 2-9 transverse and 0-3 longitudinal septa. The size of the basal scars is  $2-3 \mu\text{m}$ .

This taxon was described in 1986 from several grasses by Simmons. He mentions the most frequent occurrence on *Triticum*, *Elymus*, *Lolium*, and *Festuca*. Its teleomorph *Lewia infectoria* (Fuckel) Barr et Simmons (syn. *Pleospora infectoria* Fuckel) was described as early as 1870 growing on *Hordeum* and *Triticum* (ascospores  $12-25 \times 7-9 \mu\text{m}$ ). Fitt (1991) also mentions its occurrence on flax (*Linum usitatissimum* L.).

Collections. Host: *Lolium perenne* L.

— Moravia: Víkřovice, Šumperk district, 1 Sep 1985 (Ondřej, private herb.).

***Alternaria leucanthemi*** Nelen, Bot. Mater, Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 15:148-150, 1962.

This fungus (Fig. 5) forms brown-black, later merging spots on leaves. Infected stalks die off soon. The conidiophores are brown, septate, scarred after the conidia haven fallen off, and  $15-50 \times 6-8 \mu\text{m}$  large. The conidia are cylindrical in shape, are formed individually, lack a beak and measure  $20-120 \times 10-20$  (30)  $\mu\text{m}$ . They

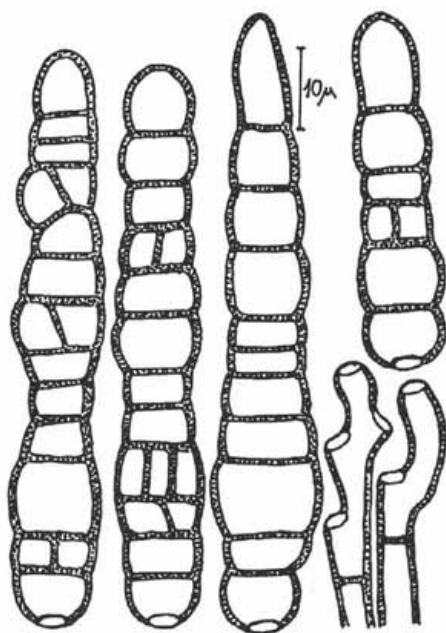


Fig. 5. *Alternaria leucanthemi* Nelen

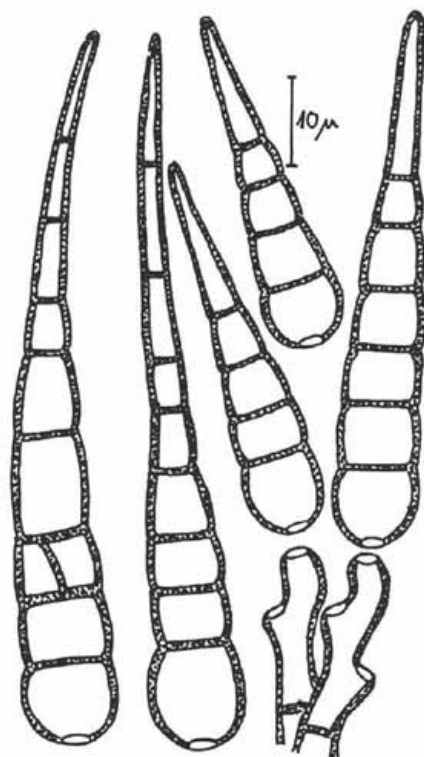


Fig. 6. *Alternaria thalictrina* Ondřej

count 10-20 transverse and 0-4 longitudinal septa. The basal scars are 4,5-5,5  $\mu\text{m}$  large.

It was apparently described invalidly first in the year 1957 by Crosier and Heit (*A. chrysanthemi*) and again in 1958 by Schmidt (*A. leucanthemi*). In both cases no Latin diagnosis was provided and the type material was not identified.

Collections. Host: *Leucanthemum vulgare* Lam.

— Moravia: Šumperk, 10 Sep 1989, 3 Aug 1990 (Ondřej, private herb.).

***Alternaria thalictrina* Ondřej, Acta Musei Silesiae, Opava, Ser. A, XXIII:147, 1974**

This species (Fig. 6) forms brown-black, later merging spots on leaves. It is very aggressive fungus and seriously damages the host plant. On the spots abundant brown-coloured septate conidiophores are formed, which are scarce after the conidia have fallen off and 20-50 (100)  $\times$  4-6 (7)  $\mu\text{m}$  large. The conidia are light brown, reversely clavate, are formed individually, 40-90 (110)  $\times$  8-14 (16)  $\mu\text{m}$

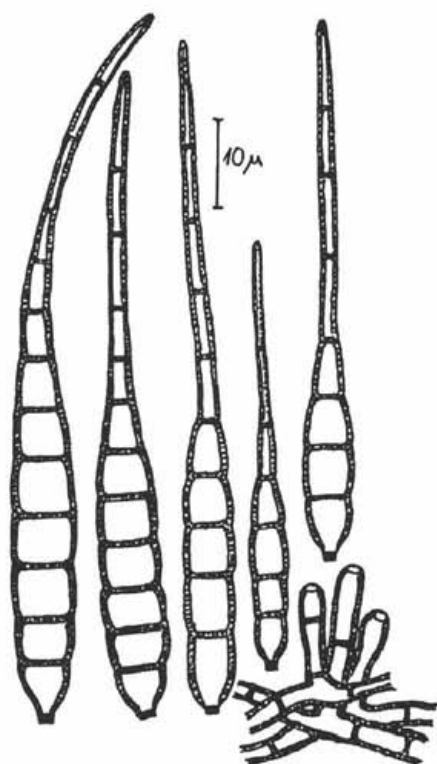


Fig. 7. *Alternaria caricina* Ondřej spec. nov.

in size, with 4-10 transverse septa and 0 or 1 longitudinal septum. Basal scars 4-6  $\mu\text{m}$ .

It was first found by H. Zavřel in 1945 near Turovice. Picbauer, who identified Zavřel's collections, erroneously identified the collection as *Alternaria tenuis* Ness.

Collections. Host: *Thalictrum aquilegifolium* L.

— Moravia: Bystřice pod Hostýnem, W of Turovice, 10 June 1945 (Zavřel BRA), Hrubý Jeseník, Podolský brook, 29 Aug 1969 (Ondřej BRA — Type).

— Slovakia: Nízke Tatry, Kráľova Hôľa, 1 July 1984 (Ondřej, private herb.), Černý Váh, 3 July 1984 (Ondřej, private herb.).

*Alternaria caricina* Ondřej spec. nov. (sect. *Noncatenatae* Neergaard)

This species (Fig.7) causes a browning and drying up of leaves of the sedge *Carex brizoides* L.

The conidiophores are brown coloured and formed on a mycelium that grows on the surface of died off leaf networks. Conidia arise individually on small

conidiophores 10-20 (25) × 4-6 μm in size. They are coloured light brown to brown, reversely clavate in shape, possess 4-15 (20) transverse septa, and are 60-190 × 8-10 (14) μm large. The occurrence of longitudinal septa was not established. The basal cell is remarkable by its prominent scar 2-2,5 μm large.

The species comes close to *Alternaria scirpicola* (Fuckel) Lucas et Webster (teleomorph *Pleospora scirpicola* (DC.) Karst.) which parasitizes on a group of hosts: *Scirpus*, *Eleocharis* and *Cyperus*. On *Carex* plants also a different species parasitizes, *Pleospora valesiaca* (Niessl) E. Müller, with a so far undescribed conidium stage of an *Alternaria* species (Sivanesan 1984).

Notice:

A similar species with larger conidia (without transverse septa and with short conidiophores) is known under the name *A. scirpicola* (Fuckel) Sivanesan (1984), (= *Sporidesmium scirpicola* (Fuckel) = *Clasterosporium scirpicolum* (Fuckel) Sacc. = *Cercospora scirpicola* (Fuckel) van Zinderen Bakker).

*Alternaria caricina* Ondřej spec. nov.

Descriptio: Conidiophora brunnea, laevia ex lateribus hypharum oriunda, singula, recta, 0-1(2) septata, 10-20(25) × 4-6 μm. Conidiis acrogenis, singulatim natis, obclavatis, pallidebrunneis vel fuscis, 60-190 × 8-10(14) μm, transverse 4-20 septatis. Cicatrice basali protuberante, 2-2,5 μm lata.

Habitatio: Parasitice in foliis vivis *Caricis brizoidis* L., Czech Republic, Moravia septentrionalis: Vikýřovice, pr. Šumperk 24.6.1984, Michal Ondřej legit. Typus in herbario Musei Nat. Praha (PRM) asservatur.

Collections. Host: *Carex brizoides* L.

— Moravia: Vikýřovice, Šumperk district, 24 June 1984 (Ondřej PRM — Type), 31 Sep 1985, 10 Oct 1989 (Ondřej, private herb.), Třemešek, Šumperk district, 16 Oct 1994 (Ondřej, private herb.).

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