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The first report of *Neoramularia bidentis* from Europe

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Abstract — *Neoramularia bidentis*, hitherto known only from a few Korean localities, has recently been found in southern Poland. The habit, morphology and ecology of this species and its host, *Bidens tripartita*, are described, discussed and compared with *Neoramularia spissa*, and *Ramularia concomitans*, a similar hyphomycete on *Bidens* species.

Key words — anamorphic fungi, hyphomycetes, distribution

Introduction

The genus *Neoramularia* U. Braun was introduced by Braun (1991). After the modification of the circumscription and subsequent redispositions (Braun 1998, Shin & Braun 1996), it now comprises ten species worldwide. They parasitize mostly dicots, and only *Neoramularia phragmitis* (Nagorny) U. Braun has been found on a member of the family *Poaceae*, viz. *Phragmites australis* (Cav.) Trin ex Steud. (compare Table 1). While four *Neoramularia* species are known exclusively from their type localities, *Neoramularia kochiae* (Woron.) U. Braun, *N. oxytropidis* (Jacz.) U. Braun, *N. phragmitis*, *N. rubi* (Bubák) U. Braun and *N. spissa* (Harkn.) U. Braun occur more abundantly (Braun 1998). *N. bidentis* should now be added to this more widespread group.

The description of *Neoramularia bidentis* is based on material collected by Shin in South Korea in 1992 (Shin & Braun 1993). Although it was repeatedly observed in Kangung and Seoul in the following years (Shin & Kim 2001), this species was not found outside South Korea (Farr et al. 2008). However, *Neoramularia bidentis* has recently been collected in Poland during studies on

micromycetes in southwest part of the country. It is the first confirmed locality of this species both in Poland and in Europe.

Material and methods

Native to the Polish vascular plant flora (Mirek et al. 2002), *Bidens tripartita* L. is widespread in the whole country (Zając & Zając 2001). This plant is a permanent element of communities belonging to the Bidentetea class which develop on drying shores of inland water bodies (Matuszkiewicz 2006). In these habitats, *Bidens tripartita* coexists and competes with anthropophytes: *B. frondosa* L., and, on a lesser scale, with *B. connata* Muhl. ex Willd. (Kucharski 1992), considered to be an alien invasive species (NOBANIS, www.nobanis.org).

Infected host plants were collected in a poor meadow (Junco-Molinietum association) with the participation of species of the Bidentetea class. The fungus occurred abundantly on wild-growing *Bidens tripartita* from June to September 2006.

The collected host plants were air-dried and examined by standard light microscopy (LM). Measurements of conidia and conidiophores, mounted in lactophenol cotton blue and warmed, were taken. The monograph by Braun (1998) was used for determination. The examined collections are deposited at LOD and LBL.

Table 1. Host range and worldwide distribution of *Neoramularia* species*

Neoramularia species	host (family)	distribution
N. bidentis	*Bidens* (*Asteraceae*)	South Korea, Poland
N. capparis	*Capparis* (*Capparaceae*)	India
N. esfandiarii	*Scrophularia* (*Scrophulariaceae*)	Iran
N. karelii	*Vitex* (*Verbenaceae*)	Turkey
N. kochiae	*Ceratocarpus*, *Eurotia*, *Kochia* (*Chenopodiaceae*)	Central Asia, Caucasus, Europe
N. koreana	*Stachys* (*Lamiaceae*)	South Korea
N. oxytropidis	*Oxytropis* (*Fabaceae*)	Europe, North America
N. phragmitis	*Phragmites* (*Poaceae*)	Central Asia, Caucasus, Europe
N. rubi	*Rubus* (*Rosaceae*)	Central Asia, Caucasus, Europe
N. spissa	*Euthamia* (*Asteraceae*)	North America

*source: Braun (1998), Shin & Braun (1996).

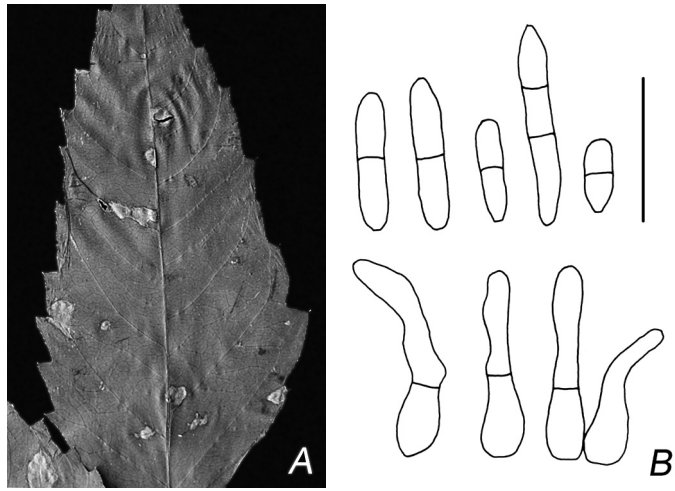

Fig. 1. *Neoramularia bidentis*: **A**, Leaf spots on *Bidens tripartita*; **B**, Conidiophores and conidia; scale bar = 20μm; A. Wołczańska *del.*

Description and discussion

Neoramularia bidentis H.D. Shin & U. Braun, Mycotaxon 49: 352. 1993.

Leaf spots irregular, 2–15 × 2–5 mm, the largest one usually elongated, yellowish brown with very thin, dark brownish margin (Fig. 1). Caespituli hypophyllous. Conidiophores solitary or in small loose groups, erect, cylindrical with slightly bulbose base, narrowed towards the tip, apex rounded, 18–32 × 4 μm, up to 7 μm wide at the base (Braun 1998: 20–32(–55) × 4(–7) μm). Conidiogenous loci inconspicuous. Conidia 0–2-septate (mostly 1-septate), cylindrical or fusoid, hyaline, 14–30 × 3.5–4.5(–5) μm (Braun 1998: 10–34 × (2.5–)3.5–5 μm). Hila neither thickened nor darkened.

Specimens examined – **POLAND. Śląskie voivodeship:** Wola near Pszczyna, Junco-Molinietum association, on *Bidens tripartita* – 22.VI.2006; Ruszkiewicz-Michalska & Myszka (LOD PF *2886*); the same host, locality and collectors, 24.VII.2006, 28.VIII.2006, 10.IX.2006 (LOD PF *2913, 2934, 3081,* LBL M *8652*).

The Polish specimens agree well with the original description of *N. bidentis* except for somewhat shorter conidiophores. Another *Neoramularia* species, *N. spissa*, was also described on hosts of the family *Asteraceae*, but it clearly differs from *N. bidentis* in having solitary, 2-celled conidia, 6–9(–10) μm wide. Conidia of *N. bidentis* are catenate or solitary; they may be 1–3-celled and (2.5–) 3.5–5 μm wide (Braun 1998). The distribution of these species is also different: *Neoramularia spissa* is confined to North America (Canada, USA), while *N. bidentis* is known from Asia (Korea) and has currently been found in Europe (Poland).

In Poland, *Ramularia concomitans* Ellis & Holw. additionally occurs on *Bidens tripartita* (Ruszkiewicz 2000, Wołczańska 2005). The morphology of hila and conidiogenous loci, which are colorless and inconspicuous in *Neoramularia* and conspicuously darkened in *Ramularia*, is the main feature that differentiates the two genera.

The present collection of *N. bidentis* represents the first confirmed locality of this species in Poland and in Europe at all. The specimen collected by Danilkiewicz (1990) in Woroblin on the Bug River, published as *Ramularia concomitans*, probably also belongs to this species (Wołczańska 2005).

Recent Polish reports of newly found phytopathogenic fungi mostly concern taxa occurring either in plant communities barely researched by mycologists or in urban areas. Our specimens of *Neoramularia bidentis* on *Bidens tripartita* have also been recorded from habitats investigated less extensively (Ławrynowicz et al. 2004). Only a few fungal species are known on this host in Poland, namely *Leptosphaeria ogilviensis* (Berk. & Broome) Ces. & De Not., *Septoria bidentis* Sacc. (Mułenko & Majewski 2008), and a powdery mildew reported by different authors as *Sphaerotheca castagnei* Lév., *S. fuliginea* (Schltdl.) Pollacci, *S. fusca* (Fr.) Blumer emend. U. Braun as well as *S. xanthii* (Castagne) L. Junell (Sałata 1985, Mułenko 1989, Danilkiewicz 1990, Hołownia & Kostrzewska 1991, Kalinowska-Kucharska & Kadłubowska 1993, Dynowska et al. 1999, Czerniawska 2001). The herbarium material must be verified to confirm the taxonomic status of these specimens in *Podosphaera fusca* (Fr.) U. Braun & Shishkoff or *P. xanthii* (Castagne) U. Braun & Shishkoff according to the criteria proposed by Braun & Takamatsu (2000).

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Literature cited

Braun U. 1991. Studies on *Ramularia* and allied genera (IV). Nova Hedwigia 53: 291–305.

Braun U. 1998. A monograph of *Cercosporella, Ramularia* and allied genera (phytopathogenic Hyphomycetes). IHW-Verlag, Eching bei München.

Braun U, Takamatsu S. 2000. Phylogeny of *Erysiphe, Microsphaera, Uncinula* (*Erysipheae*) and *Cystotheca, Podosphaera, Sphaerotheca* (*Cystotheceae*) inferred from rDNA ITS sequences – some taxonomic consequences. Schlechtendalia 4: 1–33.

Czerniawska B. 2001. *Erysiphales* of the Drawski Landscape Park (NW Poland). Acta Mycologica 36: 67–80.

Farr DF, Rossman AY, Palm ME, McCray EB. [n.d.]. Fungal Databases, Systematic Botany & Mycology Laboratory, ARS, USDA [http://nt.ars-grin.gov/fungaldatabases/ (retrieved on June 4, 2008)].

Danilkiewicz M. 1990(„1987"). Parasitic fungi of river Bug valley [Grzyby pasożytnicze lewobrzeżnej doliny środkowego Bugu]. Acta Mycologica 23: 37–80 [in Polish with English summary].

Dynowska M, Fiedorowicz G, Kubiak D. 1999. Contributions to the distribution of *Erysiphales* in Poland. Acta Mycologica 34: 79–88.

Hołownia I, Kostrzewska A. 1991. Observations on parasitic fungi of Toruń [Obserwacje nad grzybami pasożytniczymi Torunia]. Acta Universitatis Nicolai Copernici, Biologia 36: 155–163 [in Polish with English summary].

Kalinowska-Kucharska E, Kadłubowska JZ. 1993. *Erysiphaceae* in the central part of Poland [Grzyby rodziny *Erysiphaceae* Polski Centralnej]. Sprawozdania z Czynności i Posiedzeń Naukowych Łódzkiego Towarzystwa Naukowego 47: 275–279 [in Polish with English summary].

Kucharski L. 1992. The plants of American origin that invaded water bodies and wetlands in Poland [Rośliny pochodzenia amerykańskiego zadomowione w wodach i na siedliskach wilgotnych Polski]. 17–31, in M Ławrynowicz, AU Warcholińska (eds.), Rośliny pochodzenia amerykańskiego zadomowione w Polsce. Łódzkie Towarzystwo Naukowe, Łódź [in Polish with English summary].

Ławrynowicz M, Bujakiewicz A, Mułenko W. 2004. Mycocoenological studies in Poland. 1952–2002. Monographiae Botanicae 93: 1–102.

Matuszkiewicz W. 2006. Przewodnik do oznaczania zbiorowisk roślinnych Polski. 4th Ed. Wyd. Naukowe PWN, Warszawa [in Polish].

Mirek Z, Piękoś-Mirkowa H, Zając A, Zając M. (eds.). 2002. Flowering plants and pteridophytes of Poland. A checklist. in Z Mirek (ed.), Biodiversity of Poland 1: 1–442.

Mułenko W. 1989(„1988"). The microscopic pathogenic fungi of the Łęczna-Włodawa Lake District. II. The list of species [Mikroskopowe grzyby fitopatogeniczne Pojezierza Łęczyńsko-Włodawskiego. II]. Acta Mycologica 24: 125–171 [in Polish with English summary].

Mułenko W, Majewski M. (eds.). 2008. A preliminary checklist of micromycetes in Poland. in Z Mirek (ed.), Biodiversity of Poland 9 (in press).

NOBANIS – North European and Baltic Network on Invasive Alien Species [http://www.nobanis.org (viewed online on 10 November, 2007)].

Ruszkiewicz M. 2000. Microscopic phytopathogenic fungi rare and new for Poland. Acta Mycologica 35: 85–98.

Sałata B. 1985. Workowce (*Ascomycetes*), mączniakowe (*Erysiphales*). in J Kochman, A Skirgiełło (eds.), Flora polska, Grzyby (*Mycota*). 15. PWN, Warszawa–Kraków [in Polish].

Shin H-D, Braun U. 1993. Notes on Korean *Cercosporae* and Allied Genera. I. Mycotaxon 49: 351–362.

Shin H-D, Braun U. 1996. Notes on Korean *Cercosporae* and Allied Genera. II. Mycotaxon 58: 157–166.

Shin H-D, Kim J-D. 2001. *Cercospora* and Allied Genera from Korea. National Institute of Agricultural Science and Technology, Suwon, Korea.

Wołczańska A. 2005. The *Ramularia* species in Poland [Grzyby z rodzaju *Ramularia* występujące w Polsce]. Monographiae Botanicae 95: 1–154 [in Polish with English summary].

Zając A, Zając M. (eds.). 2001. Distribution Atlas of Vascular Plants in Poland. Laboratory of Computer Chorology, Institute of Botany, Jagiellonian University, Cracow.