

Graminicolous fungi from Poland. I. Fungi on halophyte *Puccinellia distans*

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The host plant *Puccinellia distans* was found to be inhabited by the following fungi: *Acrosporum graminum*, *Cladosporium herbarum*, *Colletotrichum capsici*, *Dinemasporium strigosum*, *Epichloë typhina*, *Guignardia graminicola*, *Ophiosphaerella herpotricha*, *Phaeosphaeria eustoma*, *Pleospora herbarum*, *Pyrenophora trichostoma*, *Puccinia brachypodii* var. *poae-nemoralis*. *Acrosporum graminum* and *Ophiosphaerella herpotricha* had not been earlier reported from Poland. On living stromata of *Epichloë typhina* a mycophilous *Alternaria* sp. was noted. Mycological data have been used to establish the allocation and relation of the genus *Puccinellia* with other similar grass genera.

Key words: graminicolous fungi, distribution, host-relationships, *Puccinellia distans*, halophyte, Poland.

INTRODUCTION

The ecological significance of grasses is mostly connected with widespread symbiotic association of fungi and plants. Graminicolous fungi are very important subject of recent investigations (Leuchtman and Clay 1997; Craven et al. 2001). In Poland only some papers were devoted occurrence of fungi on wild grasses (Schroeter 1889, 1908; Magnus 1895; Hellwig 1897; Namysłowski 1906, 1911; Wróblewski 1920; Dominik 1936; Starmachowa 1963; Kochman and Majewski 1973; Majewski 1977; Sałata 1985; Chlebicki 1993 a, b; Mułenko 1996; Chlebicki and Szkudlarz 2000), also on *Puccinellia distans* (Schroeter 1889, 1908; Kochman and Majewski 1973; Majewski 1979; Lembicz 1998). Results of our

investigation will be published in three parts. The aim of the first part is to describe and illustrate some rare and new for Poland graminicolous fungi as well to use mycological data to establish the allocation and relation of the genus *Puccinellia* with other similar grass genera. The second part is an ecological evidence of the host plant and fungi, and third presents interactions of isolated endophytes and their salt sensibility.

MATERIAL AND METHODS

The genus *Puccinellia* was described by Parlatore (the genus *Puccinellia* Parlatore, after Benedetto Puccinelli, 1808–1850). It comprises about 80 species, including the taxa from the earlier genus *Atropis* (Trin.) Griseb. *Puccinellia distans* represent the subfamily of *Pooideae*, family of *Poaceae* (MacFarlane and Watson 1982; Watson, Clifford and Dallwitz 1985). It is a polymorphous species classified in four taxa in the rank of subspecies (Hughes and Holliday 1980). The taxon currently spreading over anthropogenic habitats in Central Europe is *P. distans* subsp. *distans*, its base number of chromosomes is 7 and the diploidal number is $2n = 42$ (Dettmar 1993). *P. distans* subsp. *distans* occurs in whole Europe. It is facultative halophyte with distribution corresponds to that of salines (Jackowiak 1986). Recently *P. distans* have been colonizing anthropogenic habitats in Central Europe (Dettmar 1993) as well in Poland (Mirek 1987; Lembicz 1998).

The investigated material has been gathered in May and June 2000 in anthropogenic habitats over the area of the Gniezno described by Chlebicki and Lembicz (in press). Collections to be studied included dead organs of the host from the previous year and alive organs from the current vegetation season. Fungal structures were mounted in cotton blue in lactophenol. The size of the asci, ascospores and basidiospores, and conidia was measured under a Nikon Labophot 2 microscope.

The fungi species collected are deposited in the KRAM F herbarium.

FUNGI REPORTED IN LITERATURE

Cladosporium herbarium (Pers.: Fr.) Link, (Farr et al. 1989); *Claviceps purpurea* (Fr.) Tulasne, graminicolous fungus, noted in North America (Farr et al. 1989); *Entyloma dactylidis* (Pass.) Cif., noted on various *Gramineae*, also on *Puccinellia* (Farr et al. 1989; Vánky 1994); *Erysiphe graminis* DC, a cosmopolitan species, noted on 36 host genera of grasses (Farr et al. 1989) and 47 host species in Poland (Słata 1985); *Puccinia brachypodii* G. Otth var. *poae-nemoralis* (G. Otth) Cummins et H. C. Greene, Majewski (1979) reported *Puccinellia* as the host plant for this rust. So far the fungus has not

been reported on this plant from Poland; *Puccinia coronata* Corda, reported by Schroeter (1908) from Legnica on *Festuca distans* = *Puccinellia distans*. Farr et al. (1989) noted it on 45 host plant species, also on *Puccinellia*; *Puccinia graminis* Pers.: Pers., plurivorous species, noted on 60 host genera of grasses, among them on *Puccinellia* (Farr et al. 1989); *Puccinia recondita* Roberge ex Desmaz., noted on 46 host genera of grasses and various plants (Farr et al. 1989); *Puccinia striiformis* Westend., Kochman and Majewski (1973) noted it on *Aegilops*, *Agropyron*, *Agrostis*, *Bromus*, *Chloris*, *Cinna*, *Elymus*, *Lolium*, *Phalaris*, *Poa*, *Puccinellia*, *Secale*, *Sitanion*, *Trisetum*, *Triticum*, *Vulpia*; *Septoria agropyri-elongati* Lob. var. *agropyri-elongati* 1928; syn.: *Septoria agropyri-elongati* var. *atropidis* Lob. 1938, noted in Stawropolski Kraj, Byelorussia. According to Teterewnikova-Babayana (1987) this variety is restricted to *Puccinellia distans*; *Ustilago hypodytes* (Schlecht.) Fr., noted on various grasses also on *Puccinellia* (Farr et al. 1989). *Ustilago sumnevicziana* Lavrov, noted on *Puccinellia distans* in Russia is a synonyme of *U. hypodytes* (Vánky 1994); *Ustilago striiformis* (Westend.) Niessl, [= *Uredo striiformis* Westend., *Tilletia striiformis* (Westend.) Sacc.], the species was noted by Schroeter (1908) in Legnica on *Festuca distans* [= *Puccinellia distans*]. Kochman and Majewski (1973) noted it on *Agrostis*, *Alopecurus*, *Anthoxanthum*, *Briza*, *Bromus*, *Dactylis*, *Deschampsia*, *Festuca*, *Holcus*, *Koeleria*, *Lolium*, *Milium* and *Poa*. It is a cosmopolitan species. Vánky (1994) mentioned more 80 host plant species. Spooner (1977) reported this fungus on *Puccinellia maritima* from the Outer Hebrides and Savile and Parmelee (1964) recorded it on *Puccinellia angustata* in Ellesmere Island; *Ustilago trebouxii* H. Syd. et P. Syd., noted on *Agrohordeum*, *Agropyron*, *Clinelymus*, *Disticha*, *Elymus*, *Elysitanton*, *Helicotrichon*, *Hordeum*, *Leymus*, *Melica*, *Panicum*, *Poa*, *Puccinellia*, *Sitanion* and *Stipa* (Farr et al. 1989, Vánky 1994).

LIST OF COLLECTED SPECIES ON *PUCCINELLIA DISTANS*

Acrospermum graminum Lib.

Notes: on the base of culm (Fig. 1 A).

Material examined: Wielkopolska voivodeship, Pakość, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: *Melica nutans*, *Dactylis glomerata*, *Festuca ovina*, *F. rubra*, *Poa nemoralis*, *Agrostis tenuis*, *Calamagrostis arundinacea*, *C. canescens*, *Deschampsia caespitosa*, *Phleum pratense*, *Brachypodium pinnatum*, *Elymus arenarius*, *Elytrigia repens*, *Roegneria canina* (Eriksson 1967b).

Comments: outer cells are arranged in a *textura intricata* (Fig. 1 B). *A. graminum* has not so far been noted in Poland.

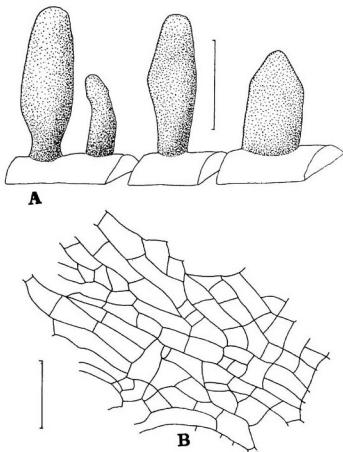


Fig. 1. Fungi on *Puccinellia distans* from Poland: *Acrospermum graminum*: A - ascomata on sheath, scale - 1 mm, B - outer cells arranged in *textura intricata*, scale: 20 μ m

Alternaria sp.

Notes: on living stromata of *Epichloë typhina*.

Diagnose: conidia elongate, light brown $90-100 \times 11-12 \mu$ m, 5-8 transverse septa (Figs 2 E, F) and sometimes one longitudinal septa in an upper part of conidium (Figs 2 A, B, C).

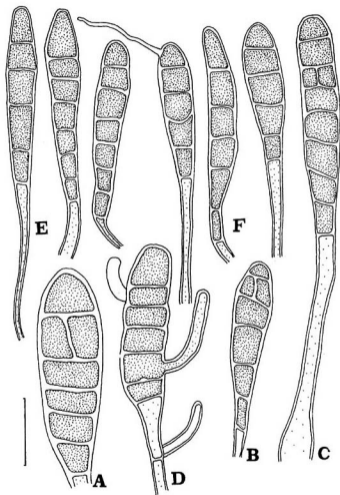


Fig. 2. Hyperparasite gathered on stromata of *Epichloë typhina* on *Puccinellia distans*: *Alternaria* sp.: A, B, C – conidia with transversal and longitudinal septa; D – conidia with germinated hyphae; E, F – conidia with transversal septa, scale: 20 μ m

Material examined: Wielkopolska voivodeship, Pakość, Giebni, Janikowo, Wigierce, May-June 2000, coll.: A. Chlebicki, KRAM F.

Host: *Epichloë typhina*.

Comments: this mycophilous fungus resembles *Alternaria longissima* Deighton et Macgarvie and need further studies. Probably the fungus is highly specialized and can be transported by parasitic fly *Botanophila* sp. In adult stromata were found conidia with germinated hyphae (Fig. 2 D). Stromata of *Epichloë typhina* are substratum for some hyperparasites. Eriksson (1967b) reported occurrence of mycoparasitic fungus *Phaeosphaeria associata* (Rehm) O. Erikss. which filling out the perithecial hollows of the *Epichloë typhina* noted on *Dactylis glomerata*. It was described by Rehm on the *Epichloë* species noted on *Mühlenbergia* from Canada (Eriksson 1967b).

Cladosporium herbarum (Pers.: Fr.) Link

teleomorph: *Mycosphaerella tassiana* (De Not.) Johans.

Notes: on culm, leaf blade and leaf sheath.

Material examined: Wielkopolska voivodeship, Pakość, Trzemeszno, Mątwy, Janikowo, May-June 2000, coll.: A. Chlebicki, KRAM F.

Hosts: plurivorous species, recorded on at least 96 species of the host plants (Farr et al. 1989).

Comments: Dominiak (1936) noted this fungus on *Eryngium maritimum* L., on dunes near Żarnowiec in Poland.

Colletotrichum capsici (Syd.) Butl. et Bisby

Notes: on culm, leaf blade and leaf sheath.

Diagnose: conidia hyaline, falcate, $22-28 \times 3,5-5 \mu\text{m}$ setae $100-140 \mu\text{m}$ long.

Material examined: Wielkopolska voivodeship, Pakość, Szarlej, Mątwy, Janikowo, Jacewo, Góra, May-June 2000, coll.: A. Chlebicki, KRAM F.

Hosts: known to occur on a wide variety of host plants from temperate, tropical and subtropical areas (Sutton 1980).

Comments: the similar species, *C. dematium* (Pers.: Fr.) Grove, was earlier noted on *Calamagrostis arundinacea* in Białowieża National Park in Poland (Chlebicki 1993a). Sutton (1980) recognized *C. capsici* as pathogenic species whereas *C. dematium* as saprotrophic.

Dinemasporium strigosum (Pers.: Fr.) Sacc. (Fig. 3 A)

teleomorph: *Phomatospora dinemasporium* Webster

Notes: on leaf blade and leaf sheath.

Material examined: Wielkopolska voivodeship, Pakość, Góra, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: cosmopolitan species, noted on many graminaceous genera (Sutton 1980).

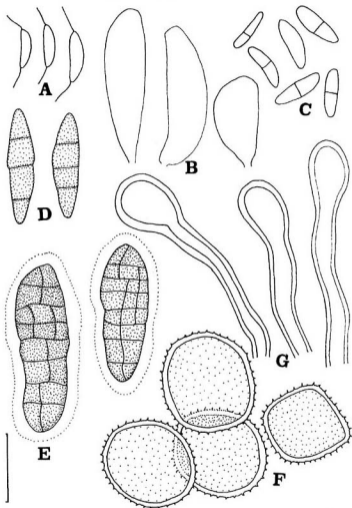


Fig. 3. Fungi on *Puccinellia distans* from Poland: *Dinemasporium strigosum*: A — conidia; *Guignardia graminicola*: B — asci, C — ascospores; *Phaeosphaeria eustoma*: D — ascospores; *Pleospora herbarum*: E — ascospores; *Puccinia brachypodii* var. *poae-nemoralis*: F — urediniospores, G — urophyses, scale: 20 μ m

Epichloë typhina (Pers. ex Fr.) Tul. et C. Tul. (Fig. 5)

anamorph: *Neotyphodium typhinum* s. lat. (Glenn et al. 1996), formerly *Acremonium typhinum* Morgan-Jones et Gams var. *fasciculatum* White (White 1993).

Notes: on the sheath of flag leaf.

Material examined: Wielkopolska voivodeship, Pakość, Giebnia, Janikowo, Ciechocinek (graduation towers), May-June 2000, coll.: A. Chlebicki, KRAM F. Hosts: the species was noted in Poland in Witoszynie near Puławy (Błoński 1896), Węgierki near Września on *Dactylis glomerata* (Hellwig 1897), Bielany Krakowskie on *Agrostis* (Namysłowski 1906) and Lower Silesia on *Anthoxanthum odoratum*, *Alopecurus pratensis*, *A. geniculatus*, *Agrostis vulgaris*, *A. alba*, *Calamagrostis arundinacea*, *Holcus lanatus*, *H. mollis*, *Poa nemoralis*, *P. trivialis*, *Festuca ovina*, *F. rubra*, *Brachypodium pinnatum*, *B. silvaticum*, *Dactylis glomerata* and *Triticum caninum* (Schroeter 1908). Wróblewski (1920) found it on *Poa pratensis* near Kraków and Dominik (1936) noted it on *Dactylis aschersoniana* in Inowrocław. Chlebicki (Bujakiewicz et al. 1992) and Mułenko (1996) found *Epichloë* sp. on *Calamagrostis arundinacea* in Białowieża National Park. Recently Chlebicki and Szkudlarz (2000) found *Epichloë clarkii* on *Holcus lanatus* in Wielkopolski National Park. The first found on *Puccinellia* has been reported by Lopez (1987) on stems of *Puccinellia festuciformis* in Cataluna (Spain). Lembicz (1998) found stromata of *E. typhina* on *Puccinellia distans* in Poland. Recently *E. typhina* complex has been divided into several species (Craven et al. 2001). *E. typhina* s. str. would attack following genera: *Dactylis*, *Lolium*, *Anthoxanthum*, *Arrhenatherum*, *Phleum* and *Poa*.

Comments: anamorph of *E. typhina* has been noted as endophyte in culm, leaf sheath, leaf blade and inflorescence of *P. distans* (Łapa, Jarmołowski and Lembicz 2000).

Guignardia graminicola (Rostrup) Vasyagina (Figs 3 B, C)

Syn.: *Laestadia graminicola* Rostrup, *Mycosphaerella aiocola* Petrak, *Guignardia graminis* (Lind) M. E. Barr

Notes: on leaf blade, leaf sheath and culm.

Material examined: Wielkopolska voivodeship, Trzemeszno, Szarlej, Janikowo, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: previously noted on *Agrostis canina*, *Alopecurus arundinaceus*, *Cynosurus cristatus*, *Deschampsia caespitosa*, *D. flexuosa*, *Elymus arenarius*, *Festuca rubra*, *Hierochloë alpina*, *Hordeum jubatum*, *Nardus stricta*, *Poa alpina*, *P. arctica*, *P. glauca*, *Roegneria mutabilis* and *Trisetum spicatum* (Eriksson 1967a).

Comments: ascospores of this species are 1–3 septate and have been found in the same pseudothecium (Eriksson 1967a). In Polish localities the fungus ascospores are 0–1 septate (Fig. 3 C).

Ophiosphaerella herpotricha (Fr.) Walker (Figs 4 A, B, C)

Syn.: *Sphaeria herpotricha* Fr., *Ophiobolus herpotrichus* (Fr.) Sacc., *Phaeosphaeria herpotricha* (Fr.) L. Holm

Notes: on culm and leaf sheath.

Diagnose: ascocarps immersed in sheath, asci subcylindric 130–160 µm long, ascospores hyaline 100–155 × 2–3 µm (Fig. 4 C), pseudoparaphyses septate (Fig. 4 B).

Material examined: Wielkopolska voivodeship, Pakość, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: previously the species has been noted on *Bromus inermis*, *Calamagrostis* sp., *Elytrigia repens*, *Poa nemoralis*, *Triticum sativum* (Holm 1957).

Comments: a new species in Poland, noted in Europe and North America (Holm 1957).

Phaeosphaeria eustoma (Fuckel) L. Holm (Fig. 3 D)

Notes: on leaf sheath.

Material examined: Wielkopolska voivodeship, Trzemeszno, Jacewo, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: on various monocotyledons, Holm (1957) noted it on 31 host plant species.

Comments: the species was noted in temperate and Arctic regions: Sweden, Great Britain, Germany, Belgium, Czech Republic, Poland, Hungary, USA, Greenland and Spitsbergen (Holm 1957).

Pleospora herbarum (Pers.: Fr.) Rabenh. (Fig. 3 E)

anamorph: *Stemphylium herbarum* Simmons

Notes: leaf sheath, node and axial part of inflorescence.

Material examined: Wielkopolska voivodeship, Mątwy, Janikowo, Ciechocinek, Inowrocław (graduation towers), May 2000, coll.: A. Chlebicki, KRAM F.

Diagnose: asci 150–160 × 20–22 µm, ascospores pale-brown, multiseptate 33–38 × 13–15 µm with gelatine sheath 2–3 µm thick (Fig. 3 E).

Hosts: plurivorous and widely distributed species.

Pyrenophora trichostoma (Fr.) Fuckel (Fig. 4 D)

Notes: on culm above flag leaf.

Material examined: Wielkopolska voivodeship, Szarlej, May 2000, coll.: A. Chlebicki, KRAM F.

Hosts: on *Carex ferruginea*, *Luzula lutea*, *L. spadicea*, *Calamagrostis villosa* (Ammon 1963), *Festuca rubra*, *Calamagrostis* sp., *Bromus inermis*, *Elymus arenarius*, *Elytrigia repens*, *Roegneria mutabilis*, *Triticum aestivum* (Eriksson 1967a), *Calamagrostis arundinacea* (Chlebicki 1993a). Farr et al. (1989) noted it on *Bromus*, *Elymus*, *Hierochloë*, *Juncus*, *Leymus*, *Poa*, *Puccinellia*, *Secale*, *Triticum* in North America and Europe.

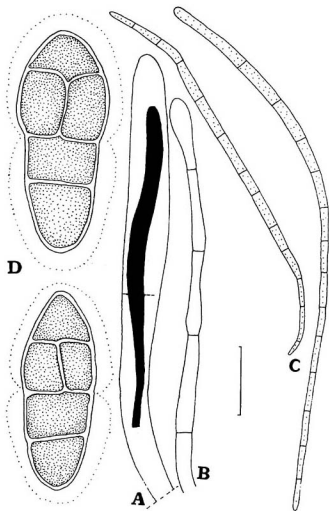


Fig. 4. Fungi on *Puccinellia distans* from Poland: *Ophiosphaerella herpotricha*: A – part of ascus, inside showed place of cut, B – paraphyse, C – ascospores; *Pyrenophora trichostoma*: D – ascospores with gelatinous sheath, scale: 20 μm

Comments: Z a b ł o c k a (1950) noted this fungus on *Hordeum vulgare*. S c h r o e t e r (1908) and P o k a c k a (1990) reported a similar species *P. tritici-repentis* in Southern Poland on *Secale cereale*.

Puccinia brachypodii G. Otth var. *poae-nemoralis* (G. Otth) Cummins et H. C. Greene (Figs 3 F, G)

Syn.: *Uredo glyceriae-dystantis* Eriks.

Notes: leaf blade, leaf sheath.

Diagnose: uredinia on upper side of leaf, sheath and culms, urediniospores oval 24–28 × 18–19 µm (Fig. 3 F), wall spinose, yellowish, urophyses up to 70 µm long, hyaline (Fig. 3 G).

Material examined: Inowroclaw (graduation towers), May 2000, coll.: A. Chlebicki, KRAM F.

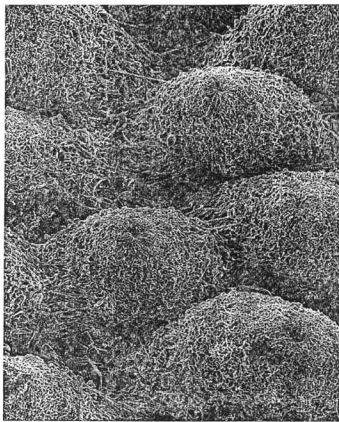
Hosts: stage II and III known from various species of the genus *Poa* as well *Agrostis*, *Alopecurus*, *Anthoxanthum*, *Calamagrostis*, *Catabrosa*, *Deschampsia*, *Festuca*, *Glyceria*, *Lolium*, *Melica*, *Milium*, *Phleum*, *Poa*, *Puccinellia*, *Sieglin-gia*, *Trisetum* (M a j e w s k i 1979, F a r r et al. 1989).

Comments: the species was noted in all territory of Poland (M a j e w s k i 1979), also in shaded town lawn (P r o Ń c z u k and P r o Ń c z u k 1996).

DISCUSSION

Earlier the species from the genus *Puccinellia* were placed in *Glyceria*, *Poa* and *Festuca*. Recently, on the basis of the similarity of DNA chloroplasts and variation of the morphological features, S o r e n g and D a v i s (1998) obtained a phylogenetic pattern for *Poaceae*, in which the clade groups *Puccinellia* and *Catabrosa* were sister taxa, in the closest relation to *Lolium*, *Festuca*, *Vulpia* and *Poa* + *Sesleria* (Fig. 6A). However relationships between the genera have not been wholly consistent (C h o o, S o r e n g and D a v i s 1994, S o r e n g and D a v i s 2000). The conflicting placement of genera can be explained by parallel and convergent evolution or by intertribal hybridization remains. It appears that *Puccinellia stricta* is an intergeneric hybrid between *Poa* and *Puccinellia*. These both genera have quite distinct cpDNA types and are widely separated within *Poaceae*. *Puccinellia distans* was placed as the sister taxon of *Sclerochloa dura*, *Catabrosa aquatica* and *Phippsia algida* (S o r e n g and D a v i s 2000).

We try to use mycological data to establish the allocation and relation of the genus *Puccinellia* with other similar grass genera. Anthropogenic populations of *Puccinellia distans* were found to be inhabited by the non-specific ubiquists, the fungi species related to monocotyledonous plants and the species occurring mainly on the *Poaceae* (Table 1).



Epichloë typhina / podkladka/

Fig. 5. *Epichloë typhina*: surface of stroma with perithecium ostiole SEM, scale 300 μ m.

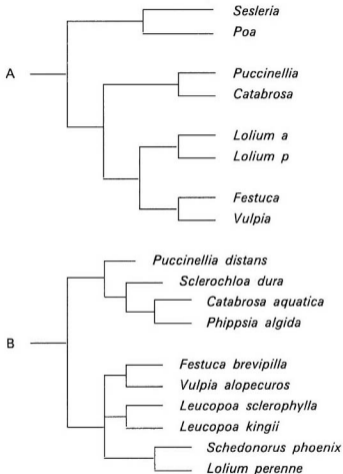


Fig. 6. Part of cladogram of *Poaceae* with *Puccinellia* and relatives: A – according to Soreng and Davis (1998); B – according to Soreng and Davis (2000).

Table 1
Host preferences of fungi collected on *Puccinellia distans*

Host preferences	Fungus
Various (ubiquists)	<i>Cladosporium herbarum</i> <i>Colletotrichum capsici</i> <i>Pleospora herbarum</i>
Monocotyledons	<i>Phaeosphaeria eustoma</i> <i>Pyrenophora trichostoma</i>
<i>Poaceae</i>	<i>Acrospermum graminum</i> <i>Claviceps purpurea</i> <i>Dinemasporium strigosum</i> <i>Entyloma dactylidis</i> <i>Epichloë typhina</i> <i>Erysiphe graminis</i> <i>Guignardia graminicola</i> <i>Ophiophaerella herpatricha</i> <i>Puccinia coronata</i> <i>Puccinia graminis</i> <i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i> <i>Puccinia recondita</i> <i>Puccinia striiformis</i> <i>Septoria agropyri-elongati</i> <i>Ustilago hypodytes</i> <i>Ustilago striiformis</i> <i>Ustilago trebouxii</i>
Together	21 species

In spite that in recent years considerable information becoming available to mycologists, the level of completeness and reliability of the mycological data is still not sufficient. Data of fungi of such genera as *Catabrosa*, *Sesleria* and *Vulpia* are very incomplete. Thus, comparable data for mycological analysis of selected clade (Fig. 6A) are available only for such genera as *Poa*, *Lolium*, *Festuca*, *Glyceria* and *Puccinellia*. The greatest number of common fungus species were noted on *Poa* and *Lolium*, fewer were present on *Glyceria* and *Festuca* (Table 2).

Table 2
Common species for *Puccinellia* and related genera

Genera	Number of common species	Similarities %
<i>Poa</i>	15	71,4
<i>Lolium</i>	11	52,6
<i>Glyceria</i>	9	42,8
<i>Festuca</i>	8	38,0
<i>Catabrosa</i> *	5	23,8

*incomplete data

In examined species of fungi and their preferences we find a very complex situation. Only some species can be considered as good mycological markers. *Puccinia recondita*, *P. coronata* and *P. striiformis* attack several festucoid grasses and rare, non-festucoid genera (Savile 1979), whereas *Puccinia brachypodii* var. *poae-nemoralis* is confined only to festucoid genera. Thus preference of this rust indicates the closeness of the clades (Fig. 6A) reported by Sorenng and Davis (1998). Baum and Savile (1985) considered the rust *Puccinia graminis* as an exclusively member of distinct super group (their table 3) which has retained a number of primitive characters in common with cypericolous rust. Also common character with cypericolous rusts (fused telial paraphyses) posses *P. recondita*.

Table 3
Fungi on related host genera

Host genus	Fungi
<i>Catabrosa</i>	<i>Erysiphe graminis</i> , <i>Puccinia graminis</i> , <i>Entyloma dactylidis</i> , <i>Colletotrichum graminicola</i> , <i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i>
<i>Glyceria</i>	<i>Claviceps purpurea</i> , <i>Epichloë glyceriae</i> , <i>Erysiphe graminis</i> , <i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i> , <i>P. coronata</i> , <i>P. graminis</i> , <i>P. recondita</i> , <i>Entyloma dactylidis</i> , <i>Colletotrichum graminicola</i>
<i>Festuca</i>	<i>Claviceps purpurea</i> , <i>Epichloë festucae</i> , <i>Erysiphe graminis</i> , <i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i> , <i>P. coronata</i> , <i>P. graminis</i> , <i>P. recondita</i> , <i>Ustilago striiformis</i>
<i>Lolium</i>	<i>Alternaria tenuis</i> , <i>Acrospermum graminum</i> , <i>Cladosporium herbarum</i> , <i>Claviceps microcephala</i> , <i>C. purpurea</i> , <i>Colletotrichum graminicola</i> , <i>Diplodinia lolii</i> , <i>Epichloë typhina</i> , <i>Erysiphe graminis</i> , <i>Gleotinia temulenta</i> , <i>Leptosphaeria culmorum</i> , <i>Mycosphaerella loliaeae</i> , <i>Puccinia coronata</i> , <i>P. graminis</i> , <i>P. recondita</i> , <i>P. striiformis</i> , <i>Septoria tritici</i> var. <i>lolii</i> , <i>Tilletia lolii</i> <i>Ustilago striiformis</i>
<i>Poa</i>	<i>Claviceps purpurea</i> , <i>Epichloë typhina</i> , <i>Erysiphe graminis</i> , <i>Pyrenophora trichostoma</i> , <i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i> , <i>P. coronata</i> , <i>P. graminis</i> , <i>P. recondita</i> , <i>P. striiformis</i> , <i>Entyloma dactylidis</i> , <i>Ustilago hypodytes</i> , <i>U. striiformis</i> , <i>U. trebouxii</i> , <i>Cladosporium herbarum</i> , <i>Colletotrichum graminicola</i> , <i>Dinemaspodium strigosum</i>
<i>Vulpia</i>	<i>Claviceps purpurea</i> , <i>Puccinia graminis</i> , <i>P. striiformis</i> , <i>Colletotrichum graminicola</i>

Recently the development of modern techniques allows classification based on genetic relationships. Known parasite *Epichloë typhina* s. str. is restricted to following host genera: *Dactylis*, *Lolium*, *Anthoxanthum*, *Arrhenatherum*, *Phleum* and *Poa*. The genus *Glyceria* posses own fungus *Epichloë glyceriae*, as well as *Festuca* posses fungus *Epichloë festucae*. In this context occurrence of *Epichloë typhina* on *Puccinellia distans* showed its affinities with the genus *Poa* and *Lolium*. Also Spooner (1977) noted close affinities of *Poa* and *Puccinellia* on the basis of the smut record (*Ustilago striiformis*). According to Savile (1979), Spooner's suggestion, that the occurrence of this rust on *Puccinellia maritima* favoured host relationships to *Poa* against *Glyceria*,

is somewhat academic, because *Puccinellia maritima* is a typical *Puccinellia*. However Soren g and D a v i s (1998) in obtained cladograms (Fig. 6A) placed *Puccinellia* near *Poa*. But their recent investigation (Soren g and D a v i s 2000) showed that *Poa* and *Puccinellia* are widely separated within Poaceae. *Puccinellia distans* was placed in the clade with 8 genera (Fig. 6B) including *Lolium perenne* (Soren g and D a v i s 2000). For using fungus data to support a closer relationships between *Puccinellia*, *Catabrosa*, *Sclerochloa* and *Phippsia* next investigations seems to be necessary.

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Grzyby występujące na trawach. I.

Grzyby na halofitycznym gatunku mannicy *Puccinellia distans*

Streszczenie

Badaniami objęto 12 antropogenicznych populacji mannicy *Puccinellia distans*. Zidentyfikowano 11 gatunków grzybów. *Acrosporum graminum* i *Ophiostoma herpeticum* nie były dotychczas podawane z terenów Polski. Grzyb *Alternaria* sp. występujący na podkładkach *Epichloë typhina* nie powodował występowania widocznych objawów chorobowych. Po przeanalizowaniu dostępnych danych mikologicznych dotyczących występowania grzybów na pokrewnych rodzajach: *Poa*, *Lolium*, *Catabrosa*, *Festuca*, *Glyceria* i *Vulpia* zwrócono uwagę na podobieństwo składu grzybów występujących na *Puccinellia* i *Poa*. Zaobserwowane podobieństwo może wynikać z różnych przyczyn. Jedną z takich przyczyn jest równoczesne występowanie grzybów, o różnym wieku, pochodzących z różnych etapów kolonizacji żywicieli.