

Threatened and protected macromycetes in the Wkrzańska Forest

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Eighty-six interesting species of macromycetes, including fungi red listed in Poland (84 species) and fungi protected in Poland (11 species), observed in the Wkrzańska Forest are described. A total of 460 species of macromycetes were recorded during mycosociological studies conducted in the period between 2003 and 2005.

Key words: macromycetes, Wkrzańska Forest, threatened species, protected species, red list of fungi

INTRODUCTION

The Wkrzańska Forest is a vast complex of ca. 1 550 km² divided between Poland and Germany (Fig. 1). The Polish part, covering 340 km² (Zaręba 1986), comprises the Wkrzańska Plain and the northern part of the Szczecińskie Hills (Kondracki 1998). *Leucobryo-Pinetum* and *Quercus roboris-Pinetum* phytocoenoses of various age dominate in the central and northern plain parts of the Wkrzańska Forest. Broadleaved and mixed tree-stands of the *Luzulo pilosae-Fagetum* and *Fago-Quercetum petraeae* associations occur in its western and southern parts on moraine hills. Small sections, scattered over the study area, are overgrown with the following associations: *Ribes nigri-Alnetum*, *Betulo pendulae-Quercetum roboris*, *Fraxino-Alnetum*, *Vaccinio uliginosi-Betuletum pubescentis*. The forests are administered by the Trzebież Forest District.

Macromycetes in the Wkrzańska Forest had not been examined before. Only 5 species of macromycetes common in Poland collected during studies on poplar mycotrophy have been reported from the area (Dominik, Ihnatowicz 1979): *Laccaria laccata*, *Laetiporus sulphureus*, *Polyporus squamosus*, *Trametes versicolor* and *Vascellum pratense*. On the other hand, the mycobiota of the adjacent regions has been investigated in relative depth: the Goleniowska Forest to the east of the study area (Friedrich 1984, 1985a, 1985b, 1997) and the city of Szczecin to the south (Friedrich 1987; Friedrich, Orzechowska 2002). Systematic mycological studies in the Wkrzańska Forest commenced in 2002. The occurrence and

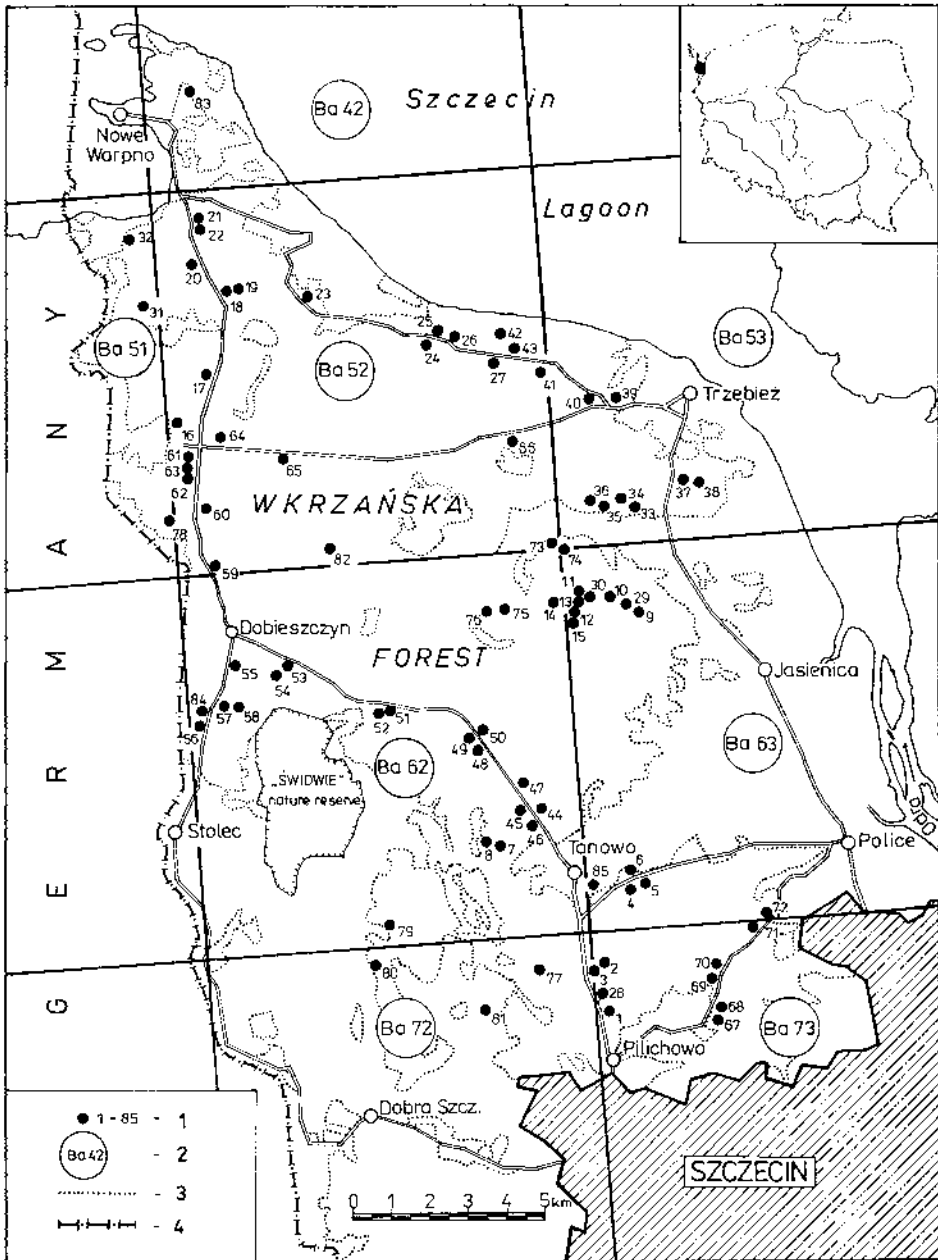


Fig. 1. Localization of macromycetes observation plots in Wkrzańska Primeval Forest: 1 observation plots (sites), 2 numbers of the grid ATPOL squares, 3 forests boundary, 4 state boundary.

the distribution of threatened and protected macromycetes are presented below. The participation and the role of macromycetes in the forest communities of the Wkrzańska Forest will be discussed separately. Analysis results will be used to compile a regional list of threatened fungi in Pomerania.

METHODS

Systematic mycosociological research was conducted at 21 permanent observations plots, 400 m² each, set up in forest communities. Community sociology was determined by the present author. Supplementary studies, that is individual mycological and phytosociological observations at additional 64 plots, also 400 m² each, were carried out throughout the periods of increased fungal fruiting. The sites were situated in the ATPOL grid squares (Tab. 1). Fruiting abundance was evaluated in the Moser's scale (1949). The growth manner of the fruit-bodies on the substrate was also identified. Mycological observations were additionally performed outside the forest areas (roadsides, forest tracts, glades, etc.) using the itinerary method, fungal species were recorded, and occurrence conditions were noted. Studies were continued over 3-4 years in permanent plots which were examined 5 times per year on average.

Fungal taxa of red-listed threatened species (Wojewoda, Ławrynowicz 1992) and protected species (Dz. U. 2004.168.1765) were included in the study.

RESULTS AND DISCUSSION

The occurrence of 460 fungal species belonging to all ecological groups were recorded during studies conducted at 85 sites between 2002 and 2005. A high percentage of mycorrhizal fungi which constitute 38% of the recorded macromycetes should be stressed. The participation of other groups is as follows: lignicolous fungi – over 30%, litter-inhabiting and bryophilous fungi – over 23%, humicolous saprobes – over 6%, plant and fungal parasites – less than 3%. Many of these taxa are threatened or rare not only in Poland.

The occurrence of 86 interesting species collected between 2002 and 2005 is described below. A total of 84 red-listed species threatened in Poland and 11 species protected in Poland were recorded in the mycobiota of the Wkrzańska Forest. One species is classified as extinct (Ex), 4 species are classified as endangered (E), 16 species are classified as vulnerable (V), 31 species are classified as rare (R), and 32 species are classified as indeterminate (I). Some threatened species are protected, and only 2 protected species (*Langermannia gigantea*, *Meripilus giganteus*) are not red-listed.

The nomenclature and systematics of the orders follow Kirk et al. (2001), and the nomenclature of the species follows many sources cited by Wojewoda (2003), mostly: Antonín & Noordeloos (1997), Hansen & Knudsen (1992, 1997, 2000), Kreisel (1987), Krieglsteiner G. J. (1991), Krieglsteiner L. (1999). Species within orders are reported alphabetically.

Threat category and protection category as well as the substrate type are given for each species, and the plant community in which the species occurs is specified. The following data are also provided: quantity range of the occurrence of fruit-bod-

Table 1
Sites of macromycetes in the Wkrzańska Forest

N°	ATPOL	Forest district	Forest division	Plant association	N°	ATPOL	Forest district	Forest division	Plant association
1	Ba73	Tanowo	813c	<i>LP</i>	39	Ba53	Pienice	110i	<i>QrP</i>
2*	Ba73	Tanowo	771g	<i>LP</i>	40	Ba53	Pienice	148b	pine greenwood
3	Ba72	Tanowo	772	<i>FQp</i>	41	Ba52	Pienice	115a	<i>LP</i>
4*	Ba63	Tanowo	718g	<i>LP</i>	42	Ba52	Pienice	83g	<i>LpF</i>
5	Ba63	Tanowo	718f	<i>QrP</i>	43	Ba52	Pienice	82l	<i>QrP</i>
6	Ba63	Tanowo	718b	pine greenwood	44	Ba62	Tatynia	666d	<i>LpF</i>
7	Ba62	Tanowo	669d	<i>LP</i>	45*	Ba62	Tatynia	667b	<i>LpF</i>
8	Ba62	Tanowo	670j	pine greenwood	50	Ba62	Tatynia	577g	<i>LP</i>
9	Ba63	Tusznica	589a	<i>LP</i>	51	Ba62	Tatynia	531c	<i>QrP</i>
10	Ba63	Tusznica	564b	<i>LP</i>	52	Ba62	Zalesie	532b	<i>QrP</i>
11	Ba63	Tusznica	516l	<i>LpF</i>	53	Ba62	Podymin	440h	<i>LP</i>
12	Ba63	Tusznica	542f	<i>LpF</i>	55*	Ba62	Podymin	444f	<i>LpF</i>
14	Ba62	Tusznica	518g	<i>LP</i>	58	Ba62	Zalesie	490a	<i>LpF</i>
16	Ba52	Myślubórz	260d	<i>LpF</i>	59	Ba52	Podymin	384f	<i>LP</i>
17	Ba52	Myślubórz	174f	<i>QrP</i>	63	Ba52	Myślubórz	299i	<i>LpF</i>
18*	Ba52	Nowe Warpno	66j	<i>LP</i>	64	Ba52	Myślubórz	257b	<i>LP</i>
19	Ba52	Nowe Warpno	66h	<i>LP</i>	65	Ba52	Myślubórz	293b	<i>LP</i>
20	Ba52	Nowe Warpno	39g	pine greenwood	66	Ba52	Mazańczyce	197c	<i>LP</i>
21	Ba52	Nowe Warpno	23d	<i>LP</i>	67*	Ba73	Siedlice	827c	<i>LpF</i>
22	Ba52	Nowe Warpno	23f	<i>QrP</i>	68*	Ba73	Siedlice	826d	<i>FQp</i>
23	Ba52	Nowe Warpno	61ab	<i>BpQr</i>	69	Ba73	Siedlice	807j	<i>LpF</i>
24*	Ba52	Pienice	89d	<i>LpF</i>	71	Ba73	Siedlice	801g	<i>QrP</i>
25	Ba52	Pienice	89c	<i>FQp</i>	72*	Ba63	Siedlice	801c	<i>FQp</i>
26*	Ba52	Pienice	86h	<i>FQp</i>	77	Ba72	Tanowo	751m	<i>LP</i>
27	Ba52	Pienice	119d	<i>LpF</i>	78	Ba51	Podymin	342d	<i>LpF</i>
28	Ba73	Tanowo	792n	<i>QrP</i>	79	Ba62	Dobra	693d	<i>LpF</i>
29	Ba63	Tusznica	565a	<i>QrP</i>	81	Ba72	Tanowo	797a	<i>LP</i>
30*	Ba63	Tusznica	541c	<i>RnA</i>	82	Ba52	Drogardz	360c	raised bog
35	Ba53	Mazańczyce	270g	<i>LpF</i>	83	Ba42	Nowe Warpno	4d	<i>BpQr</i>
36*	Ba53	Mazańczyce	271d	<i>BpQr</i>	84	Ba62	Zalesie	491d	pine greenwood
37*	Ba53	Mazańczyce	226d	<i>QrP</i>	85	Ba63	Tanowo	720b	pine greenwood
38*	Ba53	Mazańczyce	226b	<i>RnA</i>					

ies in the Moser's scale (1949), record date and a list of localities recorded between 2002 and 2005 preceded by their number in parentheses. The quantity is not given for species producing permanent fruit-bodies. The Latin plant nomenclature follows Mirek et al. (2002) and that of communities follows Matuszkiewicz (2001).

Abbreviations:

Threat categories in Poland (Wojewoda, Ławrynowicz 1992): PL Ex extinct, PL E endangered, PL V vulnerable, PL R rare, PL I indeterminate; §§ fully protected species, § partially protected species (Regulation of the Minister of the Environment of 9th July 2004); *RnA* *Ribes nigri* *Alnetum*, *LP* *Leucobryo Pinetum*, *QrP* *Quercus roboris* *Pinetum*, *BpQr* *Betula pendulae Quercetum roboris*, *FQp* *Fago Quercetum petraeae*, *LpF* *Luzulo pilosae Fagetum*; + 5 quantity range of fruit bodies according to Moser (1949); Jan. January, Aug. August, Sept. September, Oct. October, Nov. November, Dec. December; * permanent observation plot.

ASCOMYCETES

Helotiales

Ascotremella faginea (Peck) Seaver - PL-V; on a fallen branch of *Fagus sylvatica*; *LpF*; 1; July 2004; site (1): 69, (Fig. 2).

Bulgaria inquinans (Pers.: Fr.) Fr. - PL-R; on logs and fallen branches of *Quercus petraea* and *Q. robur*; *BpQr*; *QrP*; 3; Oct. 2004, Nov. 2005; sites (2): 36*, 51.

Chlorenchelia versiformis (Pers.: Fr.) Dixon - PL-I; on a log of *Quercus robur*; *BpQr*; 1; Oct. 2004; site (1): 83.

BASIDIOMYCETES

Dacrymycetales

Calocera furcata (Batsch.: Fr.) Fr. - PL-I; on logs and fallen branches of *Pinus sylvestris*; *LP*; *QrP*; 2-4; July-Nov. 2002-2005; sites (12): 7, 8, 9, 12, 19, 39, 40, 43, 53, 69, 84, 85.

Tremellales

Tremella foliacea Pers. - PL-I; on trunks and logs of *Betula pendula*; *LP*; + -1; July 2004, Oct. 2005; sites (3): 4*, 14, 64.

Tremella globospora D. A. Reid - PL-I; on old stromata of pyrenomycetous fungi growing on woods; pine greenwood; 2; Oct. 2002; site (1): 8, (Fig. 3).

Agaricales

Amanita citrina var. *alba* (Gillet) Gilbert - PL-I; on the ground under *Pinus sylvestris*; *LP*; + -1; Oct. 2005; sites (2): 2*, 65.

Amanita virosa (Fr.) Bertillon - PL-V; on the ground under *Pinus sylvestris*; *LP*; 1; Sept. 2003; site (1): 2*.

- Arrhenia retiruga* (Bull.: Fr.) Redhead - PL-I; on *Mnium hornum* moss; *RnA*: 2.2; Nov. 2004; site (1): 38*, (Fig. 4).
- Arrhenia spathulata* (Fr.: Fr.) Redhead - PL-I; on *Tortula ruralis* moss; roadside; Aug. 2004; site (1): near Karszno.
- Clitocybe candicans* (Pers.: Fr.) P. Kumm. - PL-I; on the litter; *RnA*, *QrP*, *FQp*, *LpF*: 2.2; Sept.-Nov. 2003-2005; sites (4): 3, 24*, 29, 38*.
- Clitocybe hydrogramma* (Bull.: Fr.) P. Kumm. - PL-R; on the broadleaved litter; *LpF*: Nov. 2004; site (1): 16.
- Coprinus picaceus* (Bull.: Fr.) Gray - PL-V; on the ground; *LpF*: +-1; Sept.-Oct. 2004, 2005; sites (2): 16, 67*.
- Cortinarius armeriacus* (Schaeff.: Fr.) Fr. - PL-I; on the ground; *LP*: 1; Sept. 2004; sites (2): 41, 81.
- Cortinarius orellanus* Fr. - PL-I; on the ground; *QrP*: 1-2; July 2004; site (1): 17.
- Cystodermella granulorum* (Batsch: Fr.) Harmaja - PL-R; on the ground; *QrP*: +-1; Sept.-Oct. 2004; sites (2): 17, 28.
- Entoloma juncinum* (Kühner. & Romagn.) Noordel. - PL-I; on the litter; *FQp*: 1; July 2004; site (1): 25.
- Entoloma papillatum* (Bres.) Dennis - PL-I; on the ground; *QrP*: 1; Oct. 2005; site (1): 51.
- Fayodia maura* (Fr.) Singer - PL-I; on a charred branch of *Pinus sylvestris*; *LP*: 1; Oct. 2002; site (1): near 85.
- Fistulina hepatica* (Schaeff.): Fr. - PL-V, §§; on a trunk of *Quercus robur*; 1; Sept. 2005; site (1): near 45*.
- Galerina paludosa* (Fr.) Kühn. - PL-I; among *Sphagnum* spp.; raised bog on Lake Piaszynko; 2; July 2004; site (1): 82.
- Galerina sphagnorum* (Pers.: Fr.) Kühner - PL-I; among *Sphagnum* spp.; raised bog on Lake Piaszynko; 2; July 2004; site (1): 82.
- Galerina triscopa* (Fr.) Kühner - PL-I; on a log of *Fagus sylvatica*; *LpF*: 1; Oct. 2004; site (1): 27.
- Gymnopus putillus* (Fr.: Fr.) Antonín, Halling & Noordel. - PL-I; on the litter; *QrP*: 1; Aug. 2004, Sept. 2005; site (1): 22.
- Inocybe acuta* Boud. - PL-R; on the ground; *QrP*: 1; July 2004; site (1): 43.
- Inocybe calospora* Quél. - PL-R; on the ground; *RnA*: July 2004; site (1): 30*.
- Langermannia gigantea* (Batsch: Pers.) Rostk. - §§; on the ground; July 2004, Sept. 2005; site (1): the Świdwie Ornithological Station, (Fig. 5).
- Lepiota tomentella* J. E. Lange - PL-I; on the ground; *LP*: 1; Oct. 2003; site (1): 66.
- Lyophyllum palustris* (Peck) Singer - PL-I; among *Sphagnum* spp.; raised bog on Lake Piaszynko; 2; Sept. 2004; site (1): 82.
- Macrolepiota procera* (Scop.: Fr.) Singer - PL-I; on the ground; *QrP*, *LpF*: pine greenwood, roadside; +-1; Sept.-Nov. 2002-2005; sites (5): 5, near 6, 20, 51, 64.
- Macrolepiota rhacodes* (Vittad.) Singer - PL-I; on the ground; *QrP*: forest roadside; 1; July 2004; sites (2): near 28, 71.
- Marasmiellus foetidus* (Sowerby: Fr.) Antonín, Halling & Noordel. - PL-R; on fallen twigs of *Fagus sylvatica*; *LpF*: 2; Nov. 2005; site (1): 42.
- Mycena adonis* (Bull.: Fr.) Gray - PL-R; on the litter and on fallen twigs of *Pinus sylvestris*; *LP*: 2; Oct. 2004; site (1): 81.

- Mycena atroalba* (Bolt.: Fr.) Gillet - PL-R; on a log of *Pinus sylvestris*, 2; Sept. 2003; site (1): 28.
- Mycena belliae* (Johnst.) P. D. Orton - PL-R; on culms of *Phragmites australis*; *Phragmitetum australis*; 2-3; Sept.-Nov. 1999-2004 (leg. K. Olszanowski); site (1): Lake Świdwie.
- Mycena crocata* (Schrad.: Fr.) P. Kumm. - PL-R; on fallen twigs of *Fagus sylvatica*; *LpF*; 2; Nov. 2005; sites (2): 58, 67*.
- Mycena olivaceomarginata* (Masse) Masse - PL-R; on the coniferous litter; *QrP*; 2; Sept. 2004; site (1): 71.
- Mycena pelianthina* (Fr.) Quél. - PL-I; on the broadleaved litter; *LpF*; 1-2; July 2004, Nov. 2005; sites (3): 24*, 45*, 63.
- Mycena purpureofusca* (Peck) Sacc. - PL-V; on a stump of *Pinus sylvestris*; *LpF*; 2; Oct. 2004; site (1): 45*.
- Mycena septentrionalis* Maas Geest. - PL-R; on the litter; *LP*; 1; Sept. 2004; site (1): 59.
- Mycena viridimarginata* P. Karst. - PL-V; on a stump of *Fagus sylvatica*; *LpF*; July 2004; site (1): 44.
- Omphaliaster asterosporus* (J. E. Lange) Lamoure - PL-E; on the litter among mosses; *LP*; 1-2; Nov. 2005; sites (3): 7, 9, 64.
- Oudemansiella mucida* (Schrad.: Fr.) Höhn. - PL-V; on trunks, logs and fallen branches of *Fagus sylvatica*; *LpF*; 2-3; July-Nov. 2003-2005; sites (6): 24*, 35, 45*, 55*, 67*, 79, (Fig. 6).
- Pleurotus dryinus* (Pers.: Fr.) P. Kumm. - PL-R; on stumps of *Alnus glutinosa*; *RnA*; 1; Nov. 2003; site (1): 30*.
- Pluteus atomarginatus* (Singer) Kühner - PL-V; on stumps of *Pinus sylvestris*; *LP*; +-1; July 2004, Sept.-Oct. 2005; sites (3): 37*, 50, 64.
- Psathyrella gracilis* (Fr.: Fr.) Quél. - PL-I; on the ground; *LpF*; 1; Oct. 2003; site (1): 35.
- Psilocybe elongata* (Pers.: Fr.) J. E. Lange - PL-V; among *Sphagnum* spp.; raised bog on Lake Piaszynko; 1; Oct. 2004; site (1): 82.
- Psilocybe polytrichi* (Fr.: Fr.) Pears. & Dennis - PL-R; on the litter among mosses; *LP*; Oct. 2002, Nov. 2004, Sept. 2005; sites (4): 14, 19, 64, 77.
- Psilocybe uda* (Pers.: Fr.) Gillet - PL-R; among *Sphagnum* spp.; raised bog on Lake Piaszynko; 2; Oct. 2005; site (1): 82.
- Rhodocollybia prolixa* (Hornem.: Fr.) Antonín & Noordel. var. *distorta* (Fr.) Antonín, Halling et Noordel. - PL-I; on the litter; *LP*, *QrP*; 1-2; Sept. 2004, Oct. 2005; sites (2): 21, 29.
- Tricholoma equestre* (L.: Fr.) P. Kumm. ss. lato - PL-I; on the ground under *Pinus sylvestris*; *LP*; pine greenwood; 1-2; Oct. 2003, Nov. 2005; sites (2): 2*, 66.
- Tricholoma pessundatum* (Fr.: Fr.) Quél. - PL-I; on the ground under *Pinus sylvestris*; *LP*; 1; Sept. 2004; site (1): 77.
- Tricholoma sejunctum* (Sowerby: Fr.) Quél. - PL-I; on the ground under *Fagus sylvatica* and *Quercus petraea*; *FQp*; 1; Oct. 2005; site (1): 54.

Boletales

- Boletus edulis* Bull.: Fr. - PL-V; on the ground under: *Fagus sylvatica*, *Pinus sylvestris*, *Quercus robur*; *QrP*, *LpF*, July, Oct. 2004, 2005; +-1; sites (4): 5, 51, 55*, 58.
- Boletus pinophilus* Pilát & Dermek – PL-I; on the ground under *Pinus sylvestris*; *LP*; +-1; July 2004, Sept. 2005; site (1): 18*.
- Boletus suspectus* Krombh. - PL-E; on the ground under *Fagus sylvatica*; *LpF*; 1; Nov. 2005; site (1): 24*.
- Gomphidius roseus* (Fr.) Fr. - PL-R; on the ground; *LP*; +: Oct. 2004, 2005; sites (2): 7, 64, (Fig. 7).
- Gyrodon lividus* (Bull.: Fr.) Sacc. - PL-R; on the ground; *RnA*; 1; July 2004; site (1): 38*, (Fig. 8).

Cantharellales

- Cantharellus cibarius* Fr. - PL-I; on the ground under *Pinus sylvestris*; *LP*; 1-2; July-Oct. 2003-2005; sites (5): 2*, 19, 41, 66, 77.
- Clavulina rugosa* (Bull.: Fr.) J. Schröt. - PL-R; on the ground; *LP*, pine greenwood; 1-2; Sept. 2004; sites (2): 8, 19.

Hymenochaetales

- Inonotus obliquus* (Pers.: Fr.) Pilát - PL-R, §; on a trunk of *Betula pendula*; *LP*; Jan.-Dec. 2004-2005; sites (2): 10, 18*.

Phallales

- Clavariadelphus fistulosus* (Holmsk.: Fr.) Corner - PL-R; on fallen twigs of *Betula pendula*; *LP*; 1-2; Oct. 2002; sites (2): 2*, 4*, (Fig. 9).
- Geastrum fimbriatum* Fr. - PL-R, §§; on the ground; *FQp*; 2; July 2004; site (1): 68*.
- Geastrum rufescens* Pers.: Pers. - PL-E, §§; on the ground; *FQp*; 1; Oct. 2003; site (1): 26*.
- Phallus duplicatus* Bosc - PL-E; on the ground; *LpF*; +; July 2004; site (1): 55*.

Polyporales

- Datronia mollis* (Sommerf.: Fr.) Donk - PL-I; on stumps and logs of *Fagus sylvatica*; *LpF*; Jan.-Dec. 2004-2005; sites (3): 11, 16, 45*.
- Ganoderma lucidum* (M. A. Curtis: Fr.) P. Karst. - PL-R, §§; on a stump of *Fagus sylvatica*; *LpF*; Sept. 2004; site (1): 24*.
- Ischnoderma benzoinum* (Wahlenb.: Fr.) P. Karst. - PL-R; on a log of *Pinus sylvestris*; *LP*; 1; Sept. 2003, Oct. 2005; site (1): 2*.
- Ischnoderma resinosum* (Fr.) P. Karst. - PL-V; on a log of *Fagus sylvatica*; *LpF*; 2; Oct. 2005; site (1): 45*, (Fig. 10).

- Lentinus tigrinus* (Bull.: Fr.) Fr. - PL-I; on a log of *Alnus glutinosa* and on a fallen branch of *Betula pendula*; *RnA*, *BpQr*; 1-2; Sept. 2003, Oct. 2005; sites (2): 23, 38*.
- Meripilus giganteus* (Pers.: Fr.) P. Karst. - §§; at the bases of stumps and living trunks of *Fagus sylvatica*; *LpF*, *FQp*; July-Aug. 2004, 2005; sites (7): 35, 45*, 58, 63, 67*, 72*, 78, (Fig. 11).
- Oligoporus ptychogaster* (Ludwig) R. & O. Falck - PL-R; on a log and on the coniferous litter of *Pinus sylvestris*; *LP*; 2; Sept. 2004; sites (2): 2*, 64, (Fig. 12).
- Phaeolus schweinitzii* (Fr.: Fr.) Pat. - PL-R; on trunks of *Pinus sylvestris*; *LP*, *QrP*; Nov. 2004; sites (2): 21, 37*.
- Pycnoporus cinnabarinus* (Jacq.: Fr.) P. Karst. - PL-R; on logs and fallen branches of *Betula pendula* and *Fagus sylvatica*; *LP*, *FQp*; Jan.-Dec. 2002-2004; sites (4): 25, 41, 50, 66, (Fig. 13).
- Sparassis brevipes* Krombh. - PL-V, §§; on a fallen branch of *Fagus sylvatica*; *LpF*; +; Nov. 2005; site (1): 24*, (Fig. 14).
- Sparassis crispa* (Wulf.): Fr. - PL-R, §§; on roots of *Pinus sylvestris*; *LP*, *QrP*; +-1; Sept.-Oct. 2003-2005; sites (6): 1, 9, 22, 37*, 51, 77, 83.

Russulales

- Hericium coralloides* (Scop.: Fr.) Pers. - PL-V, §§; on logs of *Fagus sylvatica*; *LpF*; +-1; Sept.- Oct. 2005; sites (3): 16, 67*, 79 (Fig. 15).
- Lactarius chrysorrheus* Fr. - PL-R; on the ground under *Quercus petraea* and *Q. robur*; *FQp*, *QrP*; 1-2; Sept.-Oct. 2004, Oct. 2005; sites (3): 25, 52, 68*.
- Lactarius deliciosus* (L.: Fr.) Gray - PL-V; on the ground under *Pinus sylvestris*; *LP*; 1-2; Oct. 2004, Sept. 2005; site (1): 21.
- Russula alutacea* (Pers.: Fr.) Fr. - PL-I; on the ground under *Fagus sylvatica*; *LpF*, *QrP*; +-1; Oct. 2003, Sept. 2004; sites (3): 11, 52, 69.
- Russula coerulea* (Pers.) Fr. - PL-Ex; on the ground under *Pinus sylvestris*; *LP*; 1; Oct. 2004; site (1): 65.
- Russula olivacea* (Schaeff.) Fr. - PL-R; on the ground under *Fagus sylvatica*; *LpF*, *FQp*; 1-2; Oct. 2003, Sept. 2004, Oct. 2005; sites (3): 27, 72*, 79.
- Stereum subtomenosum* Pouzar - PL-R; on logs of *Quercus petraea* and *Fagus sylvatica*; *LpF*, *FQp*; Jan.-Dec. 2004-2005; sites (3): 35, 44, 68*.

Thelephorales

- Phellodon tomentosus* (L.: Fr.) Banker - PL-V; on the ground in the litter; *LP*; 1; Oct. 2003; site (1): 19.
- Sarcodon imbricatus* (L.: Fr.) P. Karst. - PL-V, §§; on the ground; *LP*; 1; Oct. 2004; site (1): 2*.
- Thelephora caryophyllea* (Schaeff.): Fr. - PL-R; on the ground; *LP*; 1; Sept. 2004; site (1): 19.

CONCLUSIONS

As many as 50 species of the threatened and protected taxa are very rare and occur only at 1 locality in the Wkrzańska Forest. Twenty-six species were recorded at 2-3 localities, 6 species – at 4-5 localities, and 3 species – at 6-7 localities (*Sparassis crispa*, *Oudemansiella mucida*, *Meripilus giganteus*). Among the taxa studied, *Calocera furcata*, recorded at 12 localities, is the most common one in the Wkrzańska Forest.

Species previously not reported from Pomerania occur in the Wkrzańska Forest. These are for instance: *Arrhenia retiruga*, *A. spathulata*, *Ascotremella faginea*, *Ischnoderma benzoinum*, *I. resinosum*, *Omphaliaster asterosporus*, *Phallus duplicatus*, *Sparassis brevipes*, *Tremella globospora*. Species very rare in Poland, including taxa previously known from 1-3 localities in Poland, occur in the studied mycobiota. These are: *Phallus duplicatus*, known only from 1 site, *Arrhenia retiruga*, known from 2 localities, and *Ascotremella faginea*, *Russula coerulea* and *Tremella globospora*, known from 3 localities. It should be stressed that the two former species were previously recorded 70-90 years ago.

It should be noticed that many species of macromycetes rare in Poland, occurring at a few localities, are frequent or even common in Germany, especially in its southern part (Wojewoda 2003; Kreisel 1987; Krieglsteiner G. J. 1991). *Phallus duplicatus*, whose locality in the Wkrzańska Forest is the second site in Poland, is the best example. The taxon occurs at ca. 50 localities in Germany, including the Lands adjacent to the study area (Meklenburg – Western Pomerania, Brandenburg). Other species in this group include: *Boletus suspectus*, *Entoloma papillatum*, *Inocybe acuta*, *Ischnoderma resinosum*, *Marasmiellus foetidus*, *Russula coerulea* and *Sparassis brevipes*.

As *Russula coerulea* is recorded at the fourth locality in Poland, the species should be reclassified from extinct (Ex) to endangered (E), as suggested by Wojewoda (2003).

Over 52% threatened and protected species were recorded only in sporadic plots and during itinerary observations while only nearly 20% were recorded exclusively in permanent plots. The results confirm the significance of observations conducted outside permanent plots for the investigation of the biodiversity of macromycetes in the study area.

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Zagrożone i chronione macromycetes Puszczy Wkrzańskiej

Streszczenie

W pracy przedstawiono charakterystykę występowania wybranych taksonów grzybów wielkoowocnikowych Puszczy Wkrzańskiej. Jest to część wyników systematycznych badań mikosocjologicznych prowadzonych na 21 stałych i 64 sporadycznych powierzchniach obserwacyjnych, w latach 2002-2005. W wyniku tych badań stwierdzono 460 gatunków macromycetes, spośród których w niniejszej pracy zaprezentowano 86 gatunków. Są to taksony znajdujące się na Czerwonej Liście grzybów zagrożonych w Polsce (84 gatunki) oraz grzyby chronione w Polsce (11 gatunków). Charakterystyka poszczególnych gatunków obejmuje: kategorię zagrożenia i formę ochrony, podłoże, na którym rozwijały się owocniki, zbiorowisko roślinne, ilościowość wytwarzania owocników, okres występowania owocników oraz liczbę i wykaz stanowisk.

