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# The participation of macromycetes in selected forest communities of the Masurian Landscape Park (NE Poland)

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Results of mycosociological studies in selected forests communities of the Masurian Landscape Park between 1997 and 2000 are discussed. Observations were conducted in 8 permanent plots and 69 supplementary plots (400 $m^2$). Five plant associations characteristic of the Masurian Landscape Park, *Peucedano-Pinetum*, *Serratulo-Pinetum*, *Vaccinio uliginosi-Pinetum, Tilio-Carpinetum* and *Fraxino-Alnetum*, were examined. A total of 335 macromycete species were recorded. The greatest number of species was observed in *Tilio-Carpinetum* (198).

**Key words:** macromycetes, Ascomycetes, Basidiomycetes, forest communities, Masurian Landscape Park

## INTRODUCTION

The Masurian Landscape Park (MLP) was established in December 1977 in order to preserve and protect outstanding values of the natural environment of the Masurian Lake District. It aims to protect the richness of the fauna and the flora as well as the cultural and historical heritage. The Park is of great research and teaching importance and is an interesting tourist and recreation area (Dąbrowski, Polakowski and Wołos 1999).

A comparatively clean environment, climatic conditions and the occurrence of a great variety of plant communities relatively unaffected by anthropogenic influence have contributed to the high diversity of fungi and the preservation of many fungal species threatened in Poland or in Europe.

First reports on macromycetes from the area of the former German administrative districts of Sensburg (Mrągowo) and Johonnisburg (Pisz) date back to the early 20$^{th}$ century (Abromeit 1905; Neuhoff 1933). Alina Skirgiełło conducted wide-

ranging mycological observations in the vicinity of Kamień and Ruciane, that is in the area of the MLP at present, in the 1950s. Participants of the IV Congress of European Mycologists collected fungi in the vicinity of Mikołajki, Kamień and Ruciane in September 1966 (Skirgiełło 1968; Kotlaba, Lazebniček 1967). Studies on selected groups of macromycetes in the MLP have also been conducted by Orłoś and Dominik (1960), Domański (1963), Durska (1971), Olesiński and Wojewoda (1985).

A total of 289 taxa of macromycetes have been reported from the MLP in the available literature. No data, however, are given on the phytosociological status of their localities.

## STUDY AREA

The Masurian Landscape Park stretches between longitudes 21°20' and 21°53' E and latitudes 53°36' and 53°51' N. The surface area of the MLP is 53.655 ha and that of its protection zone is 18.608 ha. Forests cover 50% of the area (27.140 ha), waters comprise almost 30% (15.995 ha) and arable lands constitute nearly 16.6% (8.920 ha) (Polakowski, Jutrzenka-Trzebiatowski and Hołdyński 1997).

The MLP is situated on the border of three mesoregions in the physiogeographical regionalisation of Poland. The western part of the Park constitutes a fragment of the Pojezierze Mrągowskie Lake District, the eastern part belongs to the Kraina Wielkich Jezior Mazurskich Lake District, and its southern edges are part of the Równina Mazurska Plain (Kondracki 1998).

The occurrence of numerous lakes is a feature that distinguishes the MLP from other protected areas. Those are mostly large lakes whose surface area exceeds 50 ha. They comprise 22 lakes such as Śniardwy, Bełdany, Mokre or Łuknajno. A total of 60 lakes whose surface area is greater than 1 ha have been recorded in the MLP (Bajkiewicz-Grabowska 1989).

The phytosociological composition of the MLP is greatly diversified. Polakowski et al. (1976) distinguished 67 phytocoenoses in the rank of association or community based on their studies. *Peucedano-Pinetum* and *Serratulo-Pinetum* dominate among forest communities in the MLP (Polakowski et al. 1997).

## MATERIAL AND METHODS

Mycosociological field studies were carried out between 1997 and 2000. Three hundred and twelve observations were conducted in 8 permanent plots (from May 1997 to December 1999) and 106 observations in 69 supplementary plots in the plant associations examined (Fig. 1). A total of 418 observations were carried out. Observations at permanent plots were conducted every two or three weeks throughout the calendar year. Observations were also made in supplementary plots established in additional patches of phytocoenoses. Supplementary plots were observed between one and eight

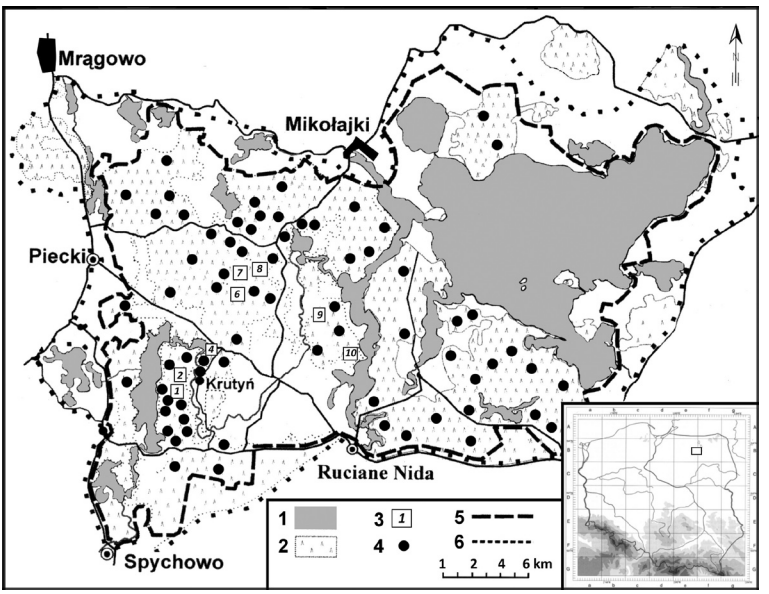


Fig. 1. Location of permanent plots in the Masurian Landscape Park.
1 – waters, 2 – forests, 3 – permanent research plots, 4 – complementary research plots, 5 – boundary of the Park, 6 – boundary of protection zone.

times. The surface area of all observation plots was 400 m$^2$ (Lisiewska 1965; Friedrich 2000). The commonly used Braun-Blanquet scale adjusted for fungi by Moser was used in the quantitative assessment (Nespiak 1959; Lisiewska 1965). The following bioecological groups of fungi were distinguished based on the type and manner of substrate utilization: mycorrhizal fungi, fungi growing on humus, litter-inhabiting fungi, fungi on wood, bryophilous fungi and parasitic fungi (Lisiewska 2000).

The nomenclature of Ascomycetes follows Chmiel (2006) and Hansen & Knudsen (2000). The nomenclature of Basidiomycetes follows Wojewoda (2003). Names of vascular plants are given according to Mirek et al. (2002) and bryophytes according to Ochyra et al. (2003). Names of phytosociological units are admitted after Matuszkiewicz (2001).

The herbarium material is deposited in the Herbarium of the Chair of Mycology, University of Warmia and Mazury, Olsztyn.

## RESULTS AND DISSCUSION

Mycological observations were conducted in 8 permanent plots. They represented five plant communities: *Peucedano-Pinetum* (W. Mat. 1962) W. Mat. & J. Mat. 1973, *Vaccinio uliginosi-Pinetum* Kleist 1929, *Serratulo-Pinetum* (W. Mat. 1981) J. Mat. 1988, *Tilio-Carpinetum* Tracz. 1962, *Fraxino-Alnetum* W. Mat. 1952 (Matuszkiewicz 2001) (Tab. 1).

Table 1
Floristic-phytosociological differentiation of forest communities
of the Masurian Landscape Park

| Successive no. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Forest community | | *P.-P.* | *V.u.-P.* | *S.-P.* | *S.-P.* | *T.-C.* | *T.-C.* | *T.-C.* | *Fr.-Al.* |
| No. of the permanent research plot | | 1 | 2 | 6 | 9 | 4 | 8 | 10 | 7 |
| Forest complex | | Krutyń | Krutyń | Kołoin | Gąsior | Krutyń | Kołoin | Gąsior | Kołoin |
| Forest section | | 101j | 101c | 245i | 203f | 53f | 221i | 215b | 221g |
| Date | | 2.06. 1997 | 2.06. 1997 | 5.08. 1997 | 5.08. 1997 | 2.06. 1997 | 2.06. 1997 | 2.06. 1997 | 2.06. 1997 |
| Density of tree layer – a (%) | | 70 | 45 | 80 | 90 | 90 | 80 | 90 | 70 |
| Density of skrub layer – b (%) | | 20 | 10 | 5 | 50 | 5 | 5 | 5 | 5 |
| Cover of herb layer – c (%) | | 90 | 80 | 30 | 70 | 90 | 80 | 80 | 100 |
| Cover of moss layer – d (%) | | 90 | 95 | 90 | 10 | 10 | 5 | 5 | 10 |
| Surface of investigated plots in $m^2$ | | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Number of plant species | | 26 | 23 | 30 | 44 | 34 | 35 | 30 | 27 |
| Ch. ***Vaccinio-Piceetea*, *Dicrano-Pinion*** | | | | | | | | | |
| *Pinus sylvestris* L. | a | 4.4 | 2.2 | 1.1 | 4.4 | . | . | 1.1 | . |
| *Pinus sylvestris* L. | b | . | 1.1 | . | . | . | . | . | . |
| *Pinus sylvestris* L. | c | + | + | + | + | . | . | . | . |
| *Picea abies* (L.) H. Karst. | a | 1.1 | . | 4.4 | 1.1 | . | . | . | . |
| *Picea abies* (L.) H. Karst | b | 1.1 | . | + | . | . | . | . | . |
| *Picea abies* (L.) H. Karst | c | + | + | + | + | . | . | . | . |
| *Vaccinium myrtillus* L. | | 4.5 | 1.2 | 1.1 | 1.1 | . | . | . | . |
| *Pleurozium schreberi* (Willd. *ex* Brid) Mitt. | d | 4.4 | +.2 | 4.4 | 1.1 | . | . | . | . |
| *Ptilium crista-castrensis* (Hedw.) De Not. | d | 1.2 | . | 2.2 | . | . | . | . | . |
| *Hylocomium splendens* (Hedw.) Schimp. | d | 1.2 | . | 1.2 | + | . | . | . | . |
| *Dicranum polysetum* Sw. *ex* anon. | d | 1.2 | . | . | . | . | . | . | . |
| *Trientalis europaea* L. | | + | . | 1.2 | + | . | . | . | . |
| *Vaccinium vitis-idaea* L. | | 1.2 | + | + | . | . | . | . | . |
| *Lycopodium annotinum* L. | | . | + | . | . | . | . | . | . |
| *Monotropa hypopitys* L. s. s. | | . | . | . | . | + | . | . | . |
| Ch. ***Oxycocco-Sphagnetea*** | | | | | | | | | |
| *Sphagnum magellanicum* Brid. | d | . | 4.4 | . | . | . | . | . | . |
| *Eriophorum vaginatum* L. | | . | 2.3 | . | . | . | . | . | . |
| *Polytrichum strictum* Menzies *ex* Brid. | d | . | 1.2 | . | . | . | . | . | . |
| *Sphagnum capillifolium* (Ehrh.) Hedw. | d | . | 1.1 | . | . | . | . | . | . |
| *Oxycoccus palustris* Pers. | | . | 1.2 | . | . | . | . | . | . |
| *Andromeda polifolia* L. | | . | + | . | . | . | . | . | . |
| *Drosera rotundifolia* L. | | . | + | . | . | . | . | . | . |
| Ch. et D. ***Peucedano-Pinetum*** | | | | | | | | | |
| *Peucedanum oreoselinum* (L.) Moench | | + | . | . | . | . | . | . | . |
| Ch. et D. ***Vaccinio uliginosi-Pinetum*** | | | | | | | | | |
| *Vaccinium uliginosum* L. | | . | 3.3 | . | . | . | . | . | . |
| *Ledum palustre* L. | | . | 2.3 | . | . | . | . | . | . |
| Ch. ***Querco-Fagetea, Fagetalia sylvaticae*** | | | | | | | | | |
| *Acer platanoides* L. | a | . | . | . | . | 1.1 | 1.1 | . | . |
| *Acer platanoides* L. | c | . | . | . | + | + | + | + | . |
| *Corylus avellana* L. | b | . | . | 1.1 | 2.2 | + | 1.2 | + | + |
| *Dryopteris filix-mas* (L.) Schott | | . | . | + | + | + | + | + | . |
| *Daphne mezereum* L. | | . | . | . | + | . | + | . | . |
| *Ranunculus lanuginosus* L. | | . | . | . | + | . | . | . | + |
| *Sanicula europaea* L. | | . | . | . | + | . | . | . | . |
| *Anemone nemorosa* L. | | . | . | . | . | 2.2 | + | 2.2 | 2.2 |
| *Hepatica nobilis* Schreb. | | . | . | . | . | 1.1 | 1.2 | + | . |
| *Mercurialis perennis* L. | | . | . | . | . | 1.2 | 1.1 | 1.2 | 2.2 |
| *Galium odoratum* (L.) Scop. | | . | . | . | . | 1.1 | 1.1 | 1.1 | . |
| *Galeobdolon luteum* Huds. | | . | . | . | . | 1.2 | + | + | + |
| *Asarum europaeum* L. | | . | . | . | . | 1.2 | + | + | . |
| *Pulmonaria obscura* Dumort. | | . | . | . | . | + | 1.1 | + | . |
| *Lathyrus vernus* (L.) Bernh. | | . | . | . | . | + | + | 1.1 | . |
| *Poa nemoralis* L. | | . | . | . | . | + | + | + | . |
| *Aegopodium podagraria* L. | | . | . | . | . | + | + | + | . |

Tab. 1. cont.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Viola reichenbachiana* Jord. ex Boreau | | . | . | . | . | + | + | + | . |
| *Atrichum undulatum* (Hedw.) P. Beauv. | d | . | . | . | . | + | + | . | . |
| *Phyteuma spicatum* L. | | . | . | . | . | + | + | . | . |
| *Polygonatum multiflorum* (L.) All. | | . | . | . | . | + | . | . | . |
| *Neottia nidus-avis* (L.) Rich. | | . | . | . | . | + | . | . | . |
| *Lilium martagon* L. | | . | . | . | . | + | . | . | . |
| *Lathraea squamaria* L. | | . | . | . | . | . | 1.2 | + | . |
| *Corydalis solida* (L.) Clairv. | | . | . | . | . | . | . | 3.3 | . |
| *Anemone ranunculoides* L. | | . | . | . | . | + | . | 1.1 | 3.3 |
| *Fraxinus excelsior* L. | a | . | . | . | . | . | . | . | 3.3 |
| *Ulmus glabra* Huds. | a | . | . | . | . | . | . | . | 1.1 |
| *Ulmus glabra* Huds. | b | . | . | . | . | . | . | . | + |
| *Stachys sylvatica* L. | | . | . | . | . | . | . | | 1.1 |
| *Milium effusum* L. | | . | . | . | . | . | . | . | + |
| Ch. ***Carpinion betuli*** | | | | | | | | | |
| *Tilia cordata* Mill. | a | . | . | . | . | 4.4 | 3.3 | 2.2 | . |
| *Tilia cordata* Mill. | b | . | . | . | . | 1.1 | + | 1.1 | . |
| *Tilia cordata* Mill. | c | . | . | . | . | + | + | + | . |
| *Carpinus betulus* L. | a | . | . | . | . | 2.2 | 2.2 | 3.3 | . |
| *Carpinus betulus* L. | b | . | . | . | . | + | . | + | . |
| *Carpinus betulus* L. | c | . | . | . | + | + | + | 1.1 | . |
| *Stellaria holostea* L. | | . | . | + | + | 1.1 | 1.1 | 1.1 | . |
| *Dactylis polygama* Horv. | | . | . | . | . | + | + | + | . |
| Ch. ***Alno-Ulmion*** | | | | | | | | | |
| *Plagiomnium undulatum* (Hedw.) T. J. Kop. | d | . | . | . | . | + | + | + | 1.1 |
| *Gagea lutea* (L.) Ker Gawl. | | . | . | . | . | 1.1 | . | . | + |
| *Chrysosplenium alternifolium* L. | | . | . | . | . | . | . | . | 1.2 |
| *Stellaria nemorum* L. | | . | . | . | . | . | . | . | + |
| *Circaea lutetiana* L. | | . | . | . | . | . | . | . | + |
| **Others** | | | | | | | | | |
| *Betula pendula* Roth. | a | 1.1 | . | . | . | 1.1 | 1.1 | + | . |
| *Quercus robur* L. | a | . | . | . | 2.2 | 1.1 | 1.1 | 1.1 | + |
| *Quercus robur* L. | b | 1.1 | . | . | 2.2 | . | . | . | . |
| *Quercus robur* L. | c | + | + | + | + | + | . | + | . |
| *Melampyrum pratense* L. | | 1.2 | + | 1.1 | + | . | . | . | . |
| *Oxalis acetosella* L. | | + | . | 2.2 | 3.3 | . | . | . | . |
| *Maianthemum bifolium* (L.) F.W. Schmidt | | + | . | + | + | + | . | + | . |
| *Convallaria majalis* L. | | . | . | + | + | . | . | + | . |
| *Plagiomnium affine* (Blandow ex Funck) T. J. Kop. | d | . | | + | + | + | + | + | . |
| *Mycelis muralis* (L.) Dumort. | | . | . | . | + | + | + | . | + |
| *Urtica dioica* L. | | . | . | . | + | + | + | + | + |

**Sporadic species:** *Ajuga reptans* L. 6 (+); *Alnus glutinosa* (L.) Gaertn. (a) 8 (2.2); *A. glutinosa* (L.) Gaertn. (b) 8 (1.1); *A. glutinosa* (L.) Gaertn. (c) 8 (+); *Anthoxanrhum odoratum* L. 1 (+); *Athyrium filix-femina* (L.) Roth 8 (+); *Betula pendula* Roth. (b) 1 (+); *B. pendula* Roth. (c) 1 (+), 3 (+); *B. pubescens* Ehrh. (a) 2 (2.2); *B. pubescens* Ehrh. (b) 2 (1.2); *B. pubescens* Ehrh. (c) 2 (+); *Calamagrostis arundinacea* (L.) Roth 1 (+), 3 (1.1), 4 (+); *Calluna vulgaris* L. 1 (+), 2 (+); *Campanula persicifolia* L. 6 (+); *C. rapunculoides* L. 4 (+); *Cardamine flexuosa* With. 8 (+); *Carex digitata* L. 5 (+), 7 (+); *Dentaria bulbifera* L. 6 (1.1); *Deschampsia caespitosa* (L.) P. Beauv. 1 (+), 3 (+), 4 (+); *Dicranum scoparium* Hedw. (d) 1 (+.2), 3 (+.2); *Digitalis grandiflora* Mill. 4 (+); *Dolichotheca seligeri* (Brid) Loeske (d) 3 (1.2), 4 (1.1); *Dryopteris carthusiana* (Vill.) H. P. Fuchs. 3 (+), 4 (+); *Dryopteris cristata* (L.) A. Gray 8 (+); *Erodium cicutarium* (L.) L`Hér. 6 (+); *Ficaria verna* L. 8 (+); *Fragaria vesca* L. 4 (+); *Frangula alnus* Mill. (b) 1 (+), 4 (+), 8 (+); *Galeopsis tetrahit* L. 4 (+), 8 (+); *Galium mollugo* L. 4 (+); *Geranium robertianum* L. 4 (+); *Geum urbanum* L. 6 (+); *Glechoma hederacea* L. 8 (+); *Hieracium murorum* L. 3 (+); *Impatiens parviflora* DC. 4 (+), 8 (+); *Leucobryum glaucum* (Hedw.) Angstr. (d) 1 (+.2); *Luzula pilosa* (L.) Willd. 3 (+), 4 (+); *Molinia caerulea* (L.) Moench 2 (+.2); *Polytrichum commune* Hedw. (d) 2 (1.2); *Polytrichum formosum* (Hedw.) G. L. Sm. (d) 1 (+.2), 3 (1.2), 4 (+); *Prunella vulgaris* L. 6 (+); *Pteridium aquilinum* (L.) Kuhn 3 (1.1), 4 (1.1); *Rubus ideus* L. 3 (+), 4 (1.1); *Rumex acetosella* L. 1 (+), 3 (+), 4 (+); *Sambucus racemosa* L. (b) 4 (+); *Sorbus aucuparia* L. em. Hedl. (c) 1 (+), 3 (+), 4 (+); *Sphagnum cuspidatum* Ehrh. *ex* Hoffm. (d) 2 (2.2); *Stellaria media* (L.) Vill. 6 (+); *Veronica officinalis* L. 4 (+); *Viola canina* L. 4 (+).

**Explanations:** *P.-P. – Peucedano-Pinetum, V.u.-P. – Vaccinio uliginosi – Pinetum, S.-P. – Serratulo-Pinetum, T.-C. – Tilio-Carpinetum, Fr.-Al. – Fraxino-Alnetum.*

Table 2
Macrofungi in the forest communities of the Masurian Landscape Park

| Successive no. | 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Forest community | *P.-P.* | | *V.u.-P.* | | *S.-P.* | | *T.-C.* | | *Fr.-Al.* | |
| Total number of species | 72 | | 35 | | 173 | | 198 | | 66 | |
| Research plots | pp | cp | pp | cp | pp | cp | pp | cp | pp | cp |
| Number of plots | 1 | 17 | 1 | 2 | 2 | 25 | 3 | 23 | 1 | 2 |
| Number of observations | 39 | 19 | 39 | 2 | 78 | 31 | 117 | 52 | 39 | 2 |
| **Mycorrhizal fungi** | | | | | | | | | | |
| Number of species | 49 | | 19 | | 75 | | 50 | | 9 | |
| *Paxillus involutus* (Batsch: Fr.) Fr. ss. lato | $11^{+2}$ | $7^{+2}$ | $9^{+2}$ | $1^{2}$ | $26^{+2}$ | $8^{+2}$ | $38^{+2}$ | $9^{1-2}$ | $3^{+1}$ | . |
| *Xerocomus badius* (Fr.: Fr.) Kühner ex Gilbert | $10^{+1}$ | $8^{+1}$ | . | . | $24^{+3}$ | $3^{1-2}$ | $1^{1}$ | . | . | . |
| *Amanita citrina* (Schaeff.) Pers. | $7^{+2}$ | $6^{+2}$ | . | . | $9^{+2}$ | $2^{+1}$ | $11^{+1}$ | $1^{1}$ | . | . |
| *Russula fragilis* (Pers.: Fr.) Fr. | . | $3^{+1}$ | . | . | $2^{1}$ | $1^{1}$ | $5^{+1}$ | $2^{1}$ | . | . |
| *Cantharellus cibarius* Fr. | $8^{+1}$ | $4^{1}$ | . | . | $7^{+2}$ | $4^{1-2}$ | $4^{+1}$ | $3^{+1}$ | . | . |
| *Russula vesca* Fr. | $4^{+1}$ | $1^{+}$ | . | . | $1^{2}$ | $2^{+1}$ | $3^{1-2}$ | $3^{+1}$ | . | . |
| *Russula cyanoxantha* (Schaeff.) Fr. | . | $1^{1}$ | . | . | $7^{+1}$ | $1^{1}$ | $12^{+1}$ | $1^{1}$ | . | . |
| *Boletus reticulatus* Schaeff. | $2^{+2}$ | . | . | . | . | $2^{1-2}$ | $1^{1}$ | $2^{+1}$ | . | . |
| *Tricholoma terreum* (Schaeff.: Fr.) P. Kumm. ss. lato | . | $1^{+}$ | . | . | $4^{1}$ | $2^{1}$ | . | $2^{+1}$ | . | . |
| *Lactarius necator* (J. F. Gmel.: Fr.) Pers. | $1^{1}$ | $1^{1}$ | . | . | $7^{+2}$ | $3^{+1}$ | $6^{+1}$ | $2^{1}$ | . | . |
| *Russula velenovskyi* Melzer & Zvára | $3^{+}$ | . | . | . | $2^{+}$ | . | $1^{+}$ | . | . | . |
| *Amanita fulva* (Schaeff.) Pers. | . | . | $9^{+2}$ | $1^{+}$ | $4^{+1}$ | $1^{1}$ | . | $2^{+1}$ | . | . |
| *Lactarius rufus* (Scop.: Fr.) Fr. | $15^{+2}$ | $5^{1-2}$ | $14^{+4}$ | $2^{1-2}$ | $30^{+2}$ | $5^{1-3}$ | . | . | . | . |
| *Russula decolorans* (Fr.: Fr.) Fr. | $14^{+2}$ | $3^{1-2}$ | $4^{+1}$ | $1^{+}$ | $6^{+1}$ | $3^{+1}$ | . | . | . | . |
| *Laccaria proxima* (Boud.) Pat. | $8^{+2}$ | $4^{1-2}$ | $10^{+1}$ | . | $8^{+2}$ | $1^{1}$ | . | . | . | . |
| *Suillus variegatus* (Schwein.: Fr.) O. Kuntze | $7^{+2}$ | $1^{1}$ | $6^{+1}$ | . | . | $1^{+}$ | . | . | . | . |
| *Entoloma cetratum* (Fr.: Fr.) M. M. Moser | $6^{+1}$ | $2^{1}$ | $5^{1-2}$ | . | $10^{+2}$ | $1^{1}$ | . | . | . | . |
| *Russula vinosa* Lindbl. | $7^{+2}$ | $1^{1}$ | . | $1^{+}$ | $7^{+1}$ | $1^{1}$ | . | . | . | . |
| *Thelephora terrestris* Her. ex Willd.: Fr. | . | $1^{1}$ | $6^{+1}$ | $1^{1}$ | $12^{+2}$ | $2^{+1}$ | . | . | . | . |
| *Leccinum scabrum* (Bull.: Fr.) Gray | $2^{1}$ | $1^{+}$ | $1^{+}$ | $1^{1}$ | . | $2^{1}$ | . | . | . | . |
| *Lactarius torminosus* (Schaeff.: Fr.) Pers. | . | $2^{+1}$ | . | $1^{1}$ | . | $1^{1}$ | . | . | . | . |
| *Lactarius vietus* (Fr.) Fr. | . | $1^{+}$ | . | $1^{1}$ | . | . | . | . | . | . |
| *Cortinarius semisanguineus* (Fr.) Gillet | $14^{+2}$ | $2^{1-2}$ | . | . | $5^{+1}$ | $2^{+1}$ | . | . | . | . |
| *Cortinarius armillatus* (Fr.: Fr.) Fr. | $9^{+2}$ | . | | . | . | $1^{1}$ | . | . | . | . |
| *Inocybe lacera* (Fr.: Fr.) P. Kumm. | $9^{+1}$ | $3^{1}$ | . | . | $8^{+1}$ | $1^{1}$ | . | . | . | . |
| *Russula emetica* (Schaeff.) Pers.: Fr. var. *silvestris* | $9^{+1}$ | $4^{+2}$ | . | . | $4^{+1}$ | $6^{+2}$ | . | . | . | . |
| *Cortinarius mucosus* (Bull.: Fr.) Kickx | $7^{+3}$ | $4^{+2}$ | . | . | $3^{+1}$ | $1^{1}$ | . | . | . | . |
| *Amanita porphyria* (Alb. & Schwein.: Fr.) Mladý | $6^{+2}$ | $2^{1}$ | . | . | $8^{+2}$ | $4^{+2}$ | . | . | . | . |
| *Xerocomus subtomentosus* (L.: Fr.) Quél. | $4^{+1}$ | $2^{+1}$ | . | . | $3^{+1}$ | $2^{1}$ | . | . | . | . |
| *Tricholoma portentosum* (Fr.: Fr.) Quél. | $5^{+1}$ | $5^{1-2}$ | . | . | $3^{+1}$ | . | . | . | . | . |
| *Tylopilus felleus* (Bull.: Fr.) P. Karst. | $5^{+1}$ | $2^{+1}$ | . | . | $9^{+2}$ | $3^{+1}$ | . | . | . | . |
| *Suillus granulatus* (L.: Fr.) Roussel | $1^{1}$ | $2^{1-2}$ | . | . | $8^{+2}$ | $2^{1}$ | . | . | . | . |
| *Inocybe dulcamara* (Alb. & Schwein.) P. Kumm. | . | $1^{1}$ | . | . | $6^{+1}$ | $3^{1}$ | . | . | . | . |
| *Lactarius mitissimus* (Fr.) Fr. | $2^{+1}$ | $1^{1}$ | . | . | . | $1^{1}$ | . | . | . | . |
| *Coltricia perennis* (L.: Fr.) Murrill | $1^{1}$ | $1^{1}$ | . | . | . | $2^{1-2}$ | . | . | . | . |
| *Suillus luteus* (L.: Fr.) Roussel | . | $3^{+2}$ | . | . | $1^{1}$ | . | . | . | . | . |
| *Russula sanguinea* (Bull.) Fr. | . | $2^{+1}$ | . | . | . | $1^{+}$ | . | . | . | . |
| *Russula ochroleuca* (Pers.) Fr. | . | $1^{1}$ | . | . | . | $2^{1}$ | . | . | . | . |
| *Russula lutea* (Huds.: Fr.) Gray | . | $1^{1}$ | . | . | . | $1^{1}$ | . | . | . | . |
| *Rozites caperatus* (Pers.: Fr.) P. Karst. | $5^{1-2}$ | $6^{1-2}$ | . | . | . | . | . | . | . | . |
| *Boletus pinophilus* Pilát & Dermek | $4^{+1}$ | $3^{+1}$ | . | . | . | . | . | . | . | . |
| *Gomphidius roseus* (Fr.) Fr. | $2^{+1}$ | $2^{+}$ | . | . | . | . | . | . | . | . |
| *Suillus bovinus* (L.: Fr.) Roussel | $1^{1}$ | $5^{1-3}$ | . | . | . | . | . | . | . | . |
| *Leccinum versipelle* (Fr.) Snell | $10^{+2}$ | . | . | . | . | . | . | . | . | . |
| *Cortinarius cinnamomeus* (L.: Fr.) Fr. | $7^{+2}$ | . | . | . | . | . | . | . | . | . |
| *Leccinum vulpinum* Watling | $1^{+}$ | . | . | . | . | . | . | . | . | . |
| *Chalciporus piperatus* (Bull.: Fr.) Bat. | . | $3^{1-2}$ | . | . | . | . | . | . | . | . |
| *Tricholoma equeste* (L.: Fr.) P. Kumm. ss. lato | . | $3^{1-2}$ | . | . | . | . | . | . | . | . |
| *Hygrophorus hypothejus* (Fr.: Fr.) Fr. | . | $1^{1}$ | . | . | . | . | . | . | . | . |
| *Russula versicolor* Jul. Schäff. | . | $1^{1}$ | . | . | . | . | . | . | . | . |

Tab. 2. cont.

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Cortinarius huronensis* Ammirati | . | . | $20^{+\cdot2}$ | $1^{1}$ | . | . | . | . | . | . |
| *Russula emetica* (Schaeff.) Pers.: Fr. var. *emetica* | . | . | $11^{+\cdot3}$ | $1^{2}$ | . | . | . | . | . | . |
| *Leccinum niveum* (Fr.) Rauschert | . | . | $7^{+\cdot2}$ | $1^{+}$ | . | . | . | . | . | . |
| *Russula paludosa* Britzelm. | . | . | $6^{+\cdot2}$ | $1^{1}$ | . | . | . | . | . | . |
| *Russula betularum* Hora | . | . | $5^{+\cdot1}$ | $1^{+}$ | . | . | . | . | . | . |
| *Lactarius helvus* (Fr.) Fr. | . | . | $5^{1\cdot2}$ | $1^{1}$ | . | . | . | . | . | . |
| *Lactarius thejogalus* (Bull.: Fr.) Gray *ss.* Neuhoff | . | . | $3^{+\cdot1}$ | . | . | . | . | . | . | . |
| *Laccaria laccata* (Scop.: Fr.) Berk. & Broome | . | . | . | . | $9^{+\cdot2}$ | $1^{1}$ | $40^{+\cdot3}$ | $6^{+\cdot2}$ | $2^{1}$ | . |
| *Inocybe geophylla* (Fr.: Fr.) P. Kumm. | . | . | . | . | $6^{+\cdot2}$ | $1^{1}$ | $18^{+\cdot2}$ | $3^{+\cdot1}$ | $6^{+\cdot1}$ | . |
| *Laccaria amethystea* (Bull.) Murrill | . | . | . | . | $14^{+\cdot2}$ | $4^{+\cdot1}$ | $15^{+\cdot2}$ | $4^{1\cdot2}$ | $1^{1}$ | . |
| *Inocybe fastigiata* (Schaeff.) Quél. | . | . | . | . | $8^{+\cdot2}$ | . | $9^{+\cdot2}$ | $4^{+\cdot1}$ | $7^{+\cdot1}$ | . |
| *Lactarius pyrogalus* (Bull.: Fr.) Fr. | . | . | . | . | $6^{+\cdot1}$ | $1^{1}$ | $13^{+\cdot2}$ | $2^{1}$ | $4^{+\cdot1}$ | . |
| *Lactarius quietus* (Fr.) Fr. | . | . | . | . | $12^{+\cdot1}$ | $1^{1}$ | $23^{+\cdot2}$ | $3^{1\cdot2}$ | . | . |
| *Xerocomus pascuus* (Pers.) Krombh. | . | . | . | . | $10^{+\cdot2}$ | $3^{1}$ | $25^{+\cdot3}$ | $5^{1\cdot3}$ | . | . |
| *Russula puellaris* Fr. | . | . | . | . | $6^{+\cdot1}$ | $1^{1}$ | . | $1^{1}$ | . | . |
| *Amanita pantherina* (DC.: Fr.) Krombh. | . | . | . | . | $6^{+\cdot1}$ | $2^{+\cdot1}$ | $3^{+\cdot1}$ | . | . | . |
| *Tricholoma sulphureum* (Bull.: Fr.) P. Kumm. | . | . | . | . | $4^{+\cdot1}$ | $1^{+}$ | $9^{+\cdot1}$ | $2^{1}$ | . | . |
| *Russula pectinata* (Bull.) Fr. *ss.* Romagn. | . | . | . | . | $3^{+\cdot1}$ | . | $8^{+\cdot1}$ | $1^{+}$ | . | . |
| *Lactarius camphoratus* Fr. | . | . | . | . | $2^{1}$ | $1^{1}$ | . | $5^{+\cdot2}$ | . | . |
| *Amanita muscaria* (L.: Fr.) Hook. | . | . | . | . | . | $1^{1}$ | $1^{+}$ | $1^{+}$ | . | . |
| *Amanita rubescens* (Pers.: Fr.) Gray | . | . | . | . | $1^{1}$ | $3^{+\cdot1}$ | $14^{+\cdot1}$ | $3^{+\cdot1}$ | . | . |
| *Craterellus cornucopiodes* (L.: Fr.) Pers. | . | . | . | . | . | $1^{2}$ | . | $4^{2\cdot4}$ | . | . |
| *Scleroderma verrucosum* (Bull.): Pers. | . | . | . | . | $2^{+\cdot2}$ | . | $1^{+}$ | . | . | . |
| *Russula xerampelina* (Schaeff.) Fr. | . | . | . | . | $7^{+\cdot1}$ | $2^{+\cdot1}$ | . | . | . | . |
| *Boletus edulis* Bull.: Fr. | . | . | . | . | $3^{+\cdot1}$ | $4^{+\cdot1}$ | . | . | . | . |
| *Chroogomphus rutilus* (Schaeff.: Fr.) O. K. Miller | . | . | . | . | $2^{1}$ | $2^{+\cdot1}$ | . | . | . | . |
| *Russula queletii* Fr. | . | . | . | . | $2^{1\cdot2}$ | $1^{+}$ | . | . | . | . |
| *Lactarius deterrimus* Gröger | . | . | . | . | $1^{2}$ | $1^{2}$ | . | . | . | . |
| *Gomphidius glutinosus* (Schaeff.: Fr.) Fr. | . | . | . | . | $1^{+}$ | $1^{1}$ | . | . | . | . |
| *Russula mustelina* Fr. | . | . | . | . | $5^{+\cdot1}$ | . | . | . | . | . |
| *Lactarius deliciosus* (L.: Fr.) Gray | . | . | . | . | $2^{1}$ | . | . | . | . | . |
| *Amanita gemmata* (Fr.) Bertillon | . | . | . | . | $1^{+}$ | . | . | . | . | . |
| *Lactarius piperatus* (L.: Fr.) Gray | . | . | . | . | . | $1^{+}$ | $10^{+\cdot1}$ | $3^{+\cdot2}$ | . | . |
| *Gyroporus castaneus* (Bull.: Fr.) Quél. | . | . | . | . | . | $2^{+\cdot1}$ | $5^{+\cdot1}$ | $1^{+}$ | . | . |
| *Scleroderma citrinum* Pers. | . | . | . | . | . | $1^{1}$ | $1^{+}$ | $1^{1}$ | . | . |
| *Tricholoma saponaceum* (Fr.: Fr.) P. Kumm. | . | . | . | . | . | $2^{1}$ | . | $2^{+\cdot1}$ | . | . |
| *Cortinarius brunneus* (Pers.: Fr.) Fr. | . | . | . | . | . | $2^{+\cdot1}$ | . | . | . | . |
| *Cortinarius traganus* (Fr.: Fr.) Fr. | . | . | . | . | . | $2^{1}$ | . | . | . | . |
| *Hygrophoropsis aurantiaca* (Wulf.: Fr.) J. Schröt. | . | . | . | . | . | $2^{1}$ | . | . | . | . |
| *Elaphomyces granulatus* Fr. | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Lactarius volemus* (Fr.) Fr. | . | . | . | . | . | $1^{+}$ | . | . | . | . |
| *Russula badia* Quél. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Russula foetens* (Pers.: Fr.) Fr. | . | . | . | . | . | $1^{+}$ | . | . | . | . |
| *Suillus grevillei* (Klotzsch: Fr.) Singer | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Hydnum repandum* L.: Fr. | . | . | . | . | . | . | $13^{+\cdot2}$ | $6^{+\cdot2}$ | . | . |
| *Entoloma rhodopolium* for. *nidorosum* (Fr.) Noordel. | . | . | . | . | . | . | $13^{+\cdot1}$ | $4^{1}$ | . | . |
| *Tricholoma lascivum* (Fr.: Fr.) Gillet | . | . | . | . | . | . | $13^{+\cdot1}$ | $2^{+\cdot1}$ | . | . |
| *Russula nigricans* (Bull.: Fr.) Fr. | . | . | . | . | . | . | $10^{1\cdot2}$ | $2^{1}$ | . | . |
| *Russula risigallina* (Batsch) Sacc. | . | . | . | . | . | . | $9^{+\cdot1}$ | $2^{1\cdot2}$ | . | . |
| *Amanita phalloides* (Vaill.: Fr.) Link | . | . | . | . | . | . | $7^{+\cdot1}$ | $5^{+\cdot2}$ | . | . |
| *Hebeloma crustuliniforme* (Bull.) Quél. | . | . | . | . | . | . | $7^{+\cdot2}$ | $2^{+\cdot1}$ | . | . |
| *Leccinum pseudoscabrum* (Kallenb.) Šutara | . | . | . | . | . | . | $5^{+\cdot2}$ | $8^{+\cdot2}$ | . | . |
| *Lactarius vellereus* (Fr.) Fr. | . | . | . | . | . | . | $3^{+\cdot1}$ | $1^{1}$ | . | . |
| *Russula delica* Fr. | . | . | . | . | . | . | $8^{+\cdot2}$ | . | . | . |
| *Amanita vaginata* (Bull.: Fr.) Vittad | . | . | . | . | . | . | $1^{1}$ | . | . | . |
| *Boletus luridus* Schaeff.: Fr. | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Cortinarius orellanus* Fr. | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Inocybe erubescens* Blytt | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Leccinum aurantiacum* (Bull.) Gray | . | . | . | . | . | . | . | $1^{2}$ | . | . |

Tab. 2. cont.

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|---|---|---|---|---|---|---|---|---|---|---|
| *Pseudocraterellus undulatus* (Pers.: Fr.) Rauschert | . | . | . | . | . | . | . | $1^{4}$ | . | . |
| *Russula solaris* Ferd. & Winge | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Xerocomus rubellus* (Krombh.) Quél. | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Cortinarius paleaceus* Fr. | . | . | . | . | . | . | . | . | $4^{+-1}$ | . |
| *Lactarius lilacinus* (Lasch: Fr.) Fr. | . | . | . | . | . | . | . | . | $3^{+-1}$ | . |
| *Paxillus rubicundulus* P. D. Ordon | . | . | . | . | . | . | . | . | $1^{+}$ | . |
| **Saprotrophic fungi on humus** | | | | | | | | | | |
| Number of species | 0 | | 0 | | 13 | | 36 | | 8 | |
| *Lycoperdon perlatum* Pers.: Pers. | . | . | . | . | . | $1^{1}$ | $20^{+-2}$ | $3^{1}$ | $5^{1-2}$ | . |
| *Humaria hemisphaerica* (F. H. Wigg.: Fr.) Fuckel | . | . | . | . | $5^{+-1}$ | . | $18^{+-3}$ | $7^{+-2}$ | . | . |
| *Cystolepiota seminuda* (Lasch) Bon | . | . | . | . | $3^{+-1}$ | $1^{+}$ | $27^{+-2}$ | $4^{+-1}$ | $5^{+-1}$ | . |
| *Agaricus silvicola* (Vittad.) Peck | . | . | . | . | $3^{+-1}$ | $1^{+}$ | $4^{+-1}$ | . | . | . |
| *Lycoperdon umbrinum* Pers.: Pers. | . | . | . | . | $14^{1-2}$ | $4^{+-2}$ | . | . | . | . |
| *Otidea leporina* (Batsch: Fr.) Fuckel | . | . | . | . | $3^{1-2}$ | $1^{2}$ | . | . | . | . |
| *Agaricus silvaticus* Schaeff. | . | . | . | . | $3^{+-1}$ | . | . | . | . | . |
| *Peziza badia* Pers.: Fr. | . | . | . | . | . | $3^{+-1}$ | . | . | . | . |
| *Geoglossum umbratile* Sacc. | . | . | . | . | . | $1^{3}$ | . | . | . | . |
| *Gyromitra esculenta* (Pers.) Fr. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Lyophyllum decastes* (Fr.: Fr.) Singer | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Macrolepiota rhacodes* (Vittad.) Singer | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Morchella conica* Pers. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Phallus impudicus* L.: Pers. | . | . | . | . | . | . | $19^{+-2}$ | $4^{1-2}$ | $2^{+}$ | . |
| *Lepiota cristata* (Bolt.: Fr.) P. Kumm. | . | . | . | . | . | . | $6^{+-1}$ | $4^{1-2}$ | $5^{+-1}$ | . |
| *Gyromitra gigas* (Krombh.) Cooke | . | . | . | . | . | . | $2^{+-1}$ | $2^{1-2}$ | $1^{+}$ | . |
| *Clavulina coralloides* (L.: Fr.) J. Schröt. | . | . | . | . | . | . | $24^{+-2}$ | $6^{+-1}$ | . | . |
| *Bovista nigrescens* Pers.: Pers. | . | . | . | . | . | . | $16^{+-2}$ | . | . | . |
| *Macrolepiota procera* (Scop.: Fr.) Singer | . | . | . | . | . | . | $14^{+-2}$ | $2^{1}$ | . | . |
| *Calvatia excipuliformis* (Scop.: Pers.) Perdeck | . | . | . | . | . | . | $10^{+-1}$ | $2^{1}$ | . | . |
| *Clavulina cinerea* (Bull.: Fr.) J. Schröt. | . | . | . | . | . | . | $6^{+-1}$ | $2^{1}$ | . | . |
| *Calocybe gambosa* (Fr.) Donk | . | . | . | . | . | . | $3^{+-2}$ | $1^{1}$ | . | . |
| *Helvella macropus* (Pers.) P. Karst. | . | . | . | . | . | . | $3^{+-1}$ | $1^{1}$ | . | . |
| *Lepiota subgracilis* Kühner ex Wasser | . | . | . | . | . | . | $3^{+}$ | . | . | . |
| *Peziza arvernensis* Boud. | . | . | . | . | . | . | $3^{+-2}$ | . | . | . |
| *Otidea onotica* (Pers.: Fr.) Fuckel | . | . | . | . | . | . | $2^{1-2}$ | $3^{2-3}$ | . | . |
| *Coprinus xanthothrix* Romagn. | . | . | . | . | . | . | $2^{+-1}$ | $1^{1}$ | . | . |
| *Peziza succosa* Berk. | . | . | . | . | . | . | $2^{1}$ | . | . | . |
| *Peziza vesiculosa* Bull. | . | . | . | . | . | . | $2^{+-1}$ | . | . | . |
| *Clavariadelphus pistillaris* (L.: Fr.) Donk | . | . | . | . | . | . | $1^{+}$ | . | . | . |
| *Agaricus placomyces* Peck | . | . | . | . | . | . | $1^{1}$ | $1^{1}$ | . | . |
| *Lycoperdon molle* Pers. | . | . | . | . | . | . | $1^{+}$ | . | . | . |
| *Helvella crispa* (Scop.) Fr. | . | . | . | . | . | . | . | $6^{1-2}$ | . | . |
| *Scutellinia scutellata* (L.) Lambotte | . | . | . | . | . | . | . | $6^{1-2}$ | . | . |
| *Coprinus atramentarius* (Bull.: Fr.) Fr. | . | . | . | . | . | . | . | $2^{1-2}$ | . | . |
| *Helvella elastica* Bull. | . | . | . | . | . | . | . | $2^{1}$ | . | . |
| *Thelephora palmata* (Scop.): Fr. | . | . | . | . | . | . | . | $2^{1}$ | . | . |
| *Albatrellus confluens* (Fr.) Kotl. & Pouzar | . | . | . | . | . | . | . | $1^{2}$ | . | . |
| *Aleuria aurantia* (Pers.: Fr.) Fuckel | . | . | . | . | . | . | . | $1^{4}$ | . | . |
| *Calvatia utriformis* (Bull.: Pers.) Jaap | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Helvella acetabulum* (L.: Fr.) Quél. | . | . | . | . | . | . | . | $1^{2}$ | . | . |
| *Langermannia gigantea* (Batsch: Pers.) Rostk. | . | . | . | . | . | . | . | $1^{+}$ | . | . |
| *Lyophyllum connatum* (Schum.: Fr.) Singer | . | . | . | . | . | . | . | $1^{2}$ | . | . |
| *Morchella esculenta* (L.) Pers. | . | . | . | . | . | . | . | $1^{+}$ | . | . |
| *Otidea cochleata* (L.) Fuckel | . | . | . | . | . | . | . | $1^{2}$ | . | . |
| *Conocybe tenera* (Schaeff.: Fr.) Fayod | . | . | . | . | . | . | . | . | $8^{+-2}$ | . |
| *Ramaria aurea* (Schaeff.: Fr.) Quél. | . | . | . | . | . | . | . | . | $8^{1-2}$ | . |
| *Mutinus caninus* (Huds.: Pers.) Fr. | . | . | . | . | . | . | . | . | $3^{+-1}$ | . |
| **Saprotrophic fungi on litter** | | | | | | | | | | |
| Number of species | 9 | | 4 | | 27 | | 21 | | 11 | |
| *Mycena galopus* (Pers.: Fr.) P. Kumm. | $11^{+-2}$ | $7^{+-2}$ | $13^{+-2}$ | $1^{1}$ | $32^{+-3}$ | $8^{+-2}$ | $9^{+-1}$ | $4^{+-1}$ | $11^{+-2}$ | . |
| *Setulipes androsaceus* (L.: Fr.) Antonín | $13^{1-5}$ | $6^{1-4}$ | $22^{+-4}$ | $2^{1-2}$ | $23^{+-4}$ | $3^{1-2}$ | . | . | . | . |

Tab. 2. cont.

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|---|---|---|---|---|---|---|---|---|---|---|
| *Mycena epipterygia* (Scop.: Fr.) Gray | $8^{+\cdot2}$ | $4^{1\cdot2}$ | $10^{+\cdot3}$ | $1^{1}$ | $7^{+\cdot2}$ | $3^{1\cdot2}$ | . | . | . | . |
| *Rhodocollybia butyracea* for. *asema* (Fr.: Fr.) Antonín, Halling & Noordel | $8^{+\cdot1}$ | $4^{1\cdot2}$ | . | . | $20^{+\cdot4}$ | $3^{1\cdot2}$ | . | . | . | . |
| *Cystoderma amianthinum* (Scop.: Fr.) Fayod | $7^{+\cdot2}$ | $4^{+\cdot1}$ | . | . | $11^{+\cdot2}$ | $1^{1}$ | . | . | . | . |
| *Strobilurus tenacellus* (Pers.: Fr.) Singer | . | $1^{1}$ | $6^{+\cdot1}$ | . | $10^{1\cdot2}$ | . | . | . | . | . |
| *Gymnopus dryophilus* (Bull.: Fr.) Murrill | . | $2^{1}$ | . | . | $16^{+\cdot2}$ | $1^{2}$ | $38^{+\cdot2}$ | $7^{1\cdot3}$ | $12^{+\cdot2}$ | $1^{1}$ |
| *Mycena sanguinolenta* (Alb. & Schwein.: Fr.) P. Kumm. | . | $1^{2}$ | . | . | $10^{+\cdot1}$ | $3^{1\cdot2}$ | $10^{1\cdot2}$ | $4^{1\cdot2}$ | $3^{1\cdot2}$ | . |
| *Auriscalpium vulgare Gray* | . | $3^{1}$ | . | . | $22^{+\cdot2}$ | $11^{+\cdot2}$ | $3^{1}$ | . | . | . |
| *Mycena pura* (Pers.: Fr.) P. Kumm. | . | . | . | . | $17^{+\cdot2}$ | $4^{1}$ | $33^{+\cdot2}$ | $4^{1\cdot2}$ | $10^{+\cdot2}$ | . |
| *Mycena vitilis* (Fr.) Quél. | . | . | . | . | $6^{+\cdot2}$ | . | $40^{+\cdot2}$ | $6^{+\cdot2}$ | $3^{+\cdot1}$ | . |
| *Clitocybe gibba* (Pers.: Fr.) P. Kumm. | . | . | . | . | $9^{+\cdot2}$ | $1^{+}$ | $27^{+\cdot2}$ | $2^{1}$ | . | . |
| *Hymenoscyphus fructigenus* (Bull.) Fr. | . | . | . | . | $1^{1}$ | . | $7^{1\cdot2}$ | $2^{1\cdot2}$ | . | . |
| *Psilocybe aeruginosa* (M. A. Curtis: Fr.) Noordel. | . | . | . | . | . | $2^{1}$ | $21^{+\cdot1}$ | $1^{2}$ | . | . |
| *Mycena stylobates* (Pers.: Fr.) P. Kumm. | . | . | . | . | $6^{1\cdot2}$ | . | $18^{+\cdot2}$ | $5^{1\cdot2}$ | . | . |
| *Gymnopus confluens* (Pers.: Fr.) Antonín, Halling & Noordel. | . | . | . | . | $5^{1\cdot2}$ | $1^{2}$ | $3^{2}$ | $1^{3}$ | . | . |
| *Gymnopus peronatus* (Bolt.: Fr.) Antonín, Halling & Noordel. | . | . | . | . | $4^{+\cdot2}$ | $2^{+\cdot3}$ | $3^{1}$ | . | . | . |
| *Clitocybe clavipes* (Pers.: Fr.) P. Kumm. | . | . | . | . | $19^{+\cdot2}$ | $4^{+\cdot1}$ | . | . | . | . |
| *Mycena zephirus* (Fr.: Fr.) P. Kumm. | . | . | . | . | $9^{+\cdot2}$ | $4^{1\cdot2}$ | . | . | . | . |
| *Strobilurus esculentus* (Wulf.: Fr.) Singer | . | . | . | . | $8^{+\cdot4}$ | . | . | . | . | . |
| *Mycena aetitis* (Fr.) Quél. | . | . | . | . | $7^{+\cdot1}$ | . | . | . | . | . |
| *Ramaria abietina* (Pers.: Fr.) Quél. | . | . | . | . | $6^{1\cdot2}$ | $1^{1}$ | . | . | . | . |
| *Marasmius scorodonius* (Fr.: Fr.) Fr. | . | . | . | . | $2^{+\cdot2}$ | $1^{2}$ | . | . | . | . |
| *Marasmiellus perforans* (Hoffm.: Fr.) Antonín, Halling & Noordel. | . | . | . | . | $2^{1\cdot2}$ | $1^{2}$ | . | . | . | . |
| *Rutstroemia bulgarioides* (Rabenh.) P. Karst. | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Strobilurus stephanocytis* (Hora) Singer | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Cystodermella granulosum* (Batsch: Fr.) Harmaja | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Marasmius rotula* (Scop.: Fr.) Fr. | . | . | . | . | . | . | $44^{+\cdot4}$ | $9^{1\cdot3}$ | $18^{1\cdot4}$ | . |
| *Rhodocollybia butyracea* (Bull.: Fr.) Lennox | . | . | . | . | . | . | $26^{+\cdot2}$ | $6^{+\cdot2}$ | $2^{1}$ | . |
| *Clitocybe nebularis* (Batsch: Fr.) P. Kumm. | . | . | . | . | . | . | $8^{+\cdot2}$ | $3^{1}$ | $6^{+\cdot1}$ | . |
| *Tubaria furfuracea* (Pers.: Fr.) Gillet | . | . | . | . | . | . | $9^{+\cdot3}$ | $3^{1\cdot2}$ | $4^{1\cdot2}$ | . |
| *Mycena polyadelpha* (Lasch) Kühner | . | . | . | . | . | . | $13^{1\cdot4}$ | $5^{1\cdot3}$ | . | . |
| *Marasmiellus foetidus* (Sowerby: Fr.) Antonín, Halling & Noordel. | . | . | . | . | . | . | . | $1^{4}$ | . | . |
| *Clitocybe geotropa* (Bull.) Quél. | . | . | . | . | . | . | $5^{+\cdot1}$ | $2^{1}$ | . | . |
| *Setulipess quercophilus* (Pouzar) Antonín | . | . | . | . | . | . | $6^{1\cdot2}$ | $2^{2}$ | . | . |
| *Lepista nuda* (Bull.: Fr.) Cooke | . | . | . | . | . | . | . | $2^{1}$ | . | . |
| *Hymenoscyphus albidus (*Roberge ex Desm.) W. Phillips | . | . | . | . | . | . | . | . | $13^{3\cdot5}$ | . |
| *Mycena rubromarginata* (Fr.: Fr.) P. Kumm. | . | . | . | . | . | . | . | . | $3^{1\cdot2}$ | . |
| **Saprotrophic fungi on wood** | | | | | | | | | | |
| Number of species | 10 | | 4 | | 41 | | 76 | | 30 | |
| *Stereum hirsutum* (Willd.: Fr.) Gray | $x^{2}$ | $1^{1}$ | . | . | $x^{2}$ | $8^{1\cdot2}$ | $3x^{2}$ | $27^{1\cdot3}$ | $x^{3}$ | $1^{2}$ |
| *Exidia plana* (Wiggers) Donk | $11^{1\cdot2}$ | $2^{2}$ | . | . | $12^{1\cdot2}$ | $4^{2}$ | $35^{1\cdot3}$ | $10^{2\cdot3}$ | . | . |
| *Pluteus atricapillus* (Batsch) Fayod | . | . | $1^{+}$ | . | $5^{+\cdot1}$ | $4^{+\cdot1}$ | $16^{+\cdot2}$ | $3^{+\cdot1}$ | $4^{+\cdot1}$ | . |
| *Piptoporus betulinus* (Bull.: Fr.) P. Karst. | . | . | $5^{1}$ | . | . | . | $10^{+\cdot1}$ | $3^{1}$ | . | . |
| *Polyporus brumalis* (Pers.): Fr. | . | $1^{+}$ | . | . | . | $1^{+}$ | $3^{1}$ | . | . | . |
| *Calocera viscosa* (Pers.: Fr.) Fr. | $5^{+\cdot1}$ | $1^{1}$ | . | . | $5^{+\cdot1}$ | $3^{1\cdot2}$ | . | . | . | . |
| *Xeromphalia campanella* (Batsch: Fr.) Kühner & Maire | $5^{1\cdot3}$ | $1^{2}$ | . | . | . | $4^{1\cdot4}$ | . | . | . | . |
| *Psilocybe capnoides* (Fr.: Fr.) Noordel. | $2^{1\cdot2}$ | $2^{1\cdot4}$ | . | . | $4^{2}$ | $3^{2\cdot3}$ | . | . | . | . |
| *Gymnopilus penetrans* (Fr.: Fr.) Murrill | . | $2^{1}$ | . | . | $7^{1\cdot2}$ | $3^{1\cdot2}$ | . | . | . | . |
| *Lentinus lepideus* (Fr.: Fr.) Fr. | . | $1^{2}$ | . | . | $1^{2}$ | . | . | . | . | . |
| *Trichaptum abietinum* (Dicks.: Fr.) Ryvarden | . | $3^{1\cdot2}$ | . | $1^{1}$ | $x^{2}$ | $1^{2}$ | . | . | . | . |
| *Trichaptum fuscoviolaceum* (Ehrenb.: Fr.) Ryvarden | . | $1^{2}$ | . | . | $2x^{2}$ | $4^{1\cdot2}$ | . | . | . | . |
| *Rhodocollybia maculata* (Alb. & Schwein.: Fr.) Singer | . | . | $1^{1}$ | . | . | . | . | . | . | . |

Tab. 2. cont.

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|---|---|---|---|---|---|---|---|---|---|---|
| *Stereum rugosum* (Pers.: Fr.) Fr. | . | . | . | . | $x^{1-3}$ | . | $2x^{1-3}$ | $8^{2}$ | $x^{3}$ | $1^{2}$ |
| *Mycena galericulata* (Scop.: Fr.) Gray | . | . | . | . | $5^{+-1}$ | $1^{2}$ | $32^{+-2}$ | $3^{1-2}$ | $14^{1-2}$ | . |
| *Psilocybe lateritia* (Schaeff.: Fr.) Noordel. | . | . | . | . | $1^{2}$ | . | $1^{2}$ | $1^{1}$ | $1^{2}$ | . |
| *Psilocybe fasticularis* (Huds.: Fr.) Noordel. | . | . | . | . | $10^{1-3}$ | $2^{2}$ | $16^{2-4}$ | $6^{2-4}$ | $1^{2}$ | . |
| *Ramaria stricta* (Pers.: Fr.) Quél. | . | . | . | . | . | $1^{1}$ | $3^{+-1}$ | $3^{1-2}$ | . | $1^{1}$ |
| *Xylaria hypoxylon* (L.) Grev. | . | . | . | . | . | $4^{1-2}$ | $3x^{1-4}$ | $28^{2-3}$ | $x^{3}$ | $1^{2}$ |
| *Xylaria polymorpha* (Pers.) Grev. | . | . | . | . | . | $2^{2}$ | $3x^{1-3}$ | $25^{1-3}$ | $x^{1}$ | $1^{2}$ |
| *Tremella mesenterica* Retz.: Fr. | . | . | . | . | . | $1^{1}$ | $2^{1}$ | . | . | . |
| *Daedalea quercina* (L.: Fr.) Pers. | . | . | . | . | . | $1^{1}$ | . | $1^{1}$ | . | . |
| *Exidia glandulosa* (Bull.): Fr. | . | . | . | . | $6^{1-2}$ | . | $5^{1-2}$ | $3^{1-2}$ | . | . |
| *Hyphodontia paradoxa* (Schrad.: Fr.) E. Langer & Vesterholt *ss. lato* | . | . | . | . | $x^{2}$ | . | $3x^{3-4}$ | $13^{2-4}$ | . | . |
| *Pholiota mutabilis* (Scop.: Fr.) P. Kumm. | . | . | . | . | $7^{1-2}$ | $2^{1-2}$ | $18^{1-2}$ | $4^{2}$ | . | . |
| *Crepidotus variabilis* (Pers.: Fr.) P. Kumm. | . | . | . | . | . | $3^{1-2}$ | $25^{+-2}$ | $3^{1-2}$ | . | . |
| *Trametes versicolor* (L.: Fr.) Pilát | . | . | . | . | . | $1^{2}$ | $2x^{2}$ | $2^{1-2}$ | . | . |
| *Geopyxis carbonaria* (Alb. & Schwein.: Fr.) Sacc. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Lycoperdon pyriforme* Schaeff.: Pers. | . | . | . | . | $17^{+-2}$ | $2^{1-2}$ | $18^{+-2}$ | $4^{1-2}$ | . | . |
| *Mycena stipata* Maas Geest. & Schwöb. | . | . | . | . | $8^{1-2}$ | . | $5^{1-2}$ | $3^{1-2}$ | . | . |
| *Stereum sanguinolentum* Alb. & Schwein.: Fr.) Fr. | . | . | . | . | $31^{1-3}$ | $2^{2}$ | . | . | . | . |
| *Pseudohydnum galatinosum* (Scop.: Fr.) P. Karst. | . | . | . | . | $5^{+-1}$ | . | . | . | . | . |
| *Pluteus atromarginatus* (Singer) Kühner | . | . | . | . | $3^{+-1}$ | . | . | . | . | . |
| *Tricholomopsis rutilans* (Schaeff.: Fr.) Singer | . | . | . | . | $2^{+-1}$ | $1^{1}$ | . | . | . | . |
| *Discina ancilis* (Pers.) Sacc. | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Oligoporus stipticus* (Pers.: Fr.) Gilbertson & Ryvarden | . | . | . | . | . | $4^{+-1}$ | . | . | . | . |
| *Panellus mitis* (Pers.: Fr.) Singer | . | . | . | . | . | $3^{2}$ | . | . | . | . |
| *Gloephyllum odoratum* (Wulf.: Fr.) Imaz. | . | . | . | . | . | $2^{1}$ | . | . | . | . |
| *Gloephyllum sepiarum* (Wulf.: Fr.) P. Karst. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Hymenochaete tabacina* (Sowerby) Lév. | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Phaeolus schweinitzii* (Fr.: Fr.) Pat. | . | . | . | . | . | $1^{+}$ | . | . | . | . |
| *Phlebia tremellosa* (Schrad.: Fr.) Nakasone & Burds. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Oligoporus caesius* (Schrad.: Fr.) Gilbertson & Ryvarden | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Ganoderma applanatum* (Pers.) Pat. | . | . | . | . | . | . | $2x^{1-2}$ | $1^{1}$ | . | $1^{1}$ |
| *Hymenochaete rubiginosa* (Schrad.: Fr.) Lév. | . | . | . | . | . | . | $x^{2}$ | $1^{2}$ | . | . |
| *Megacollybia platyphylla* (Pers.: Fr.) Kotl. & Pouzar | . | . | . | . | . | . | $18^{+-2}$ | $5^{+-1}$ | $10^{+-2}$ | . |
| *Polyporus ciliatus* Fr.: Fr. | . | . | . | . | . | . | $12^{1-4}$ | $3^{2-3}$ | $6^{1}$ | $1^{2}$ |
| *Mycena inclinata* (Fr.) Quél. | . | . | . | . | . | . | $9^{2-4}$ | . | $7^{2-5}$ | . |
| *Panellus serotinus* (Schrad.: Fr.) Kühner | . | . | . | . | . | . | $9^{2-3}$ | . | $4^{2}$ | . |
| *Polyporus badius* (Pers.) Schwein. | . | . | . | . | . | . | $7^{2-3}$ | . | . | $1^{+}$ |
| *Sarcoscypha austriaca* (O. Beck ex Sacc.) Boud. | . | . | . | . | . | . | $7^{1-4}$ | $4^{1-2}$ | $6^{+-3}$ | $1^{2}$ |
| *Delicatula integrella* (Pers.: Fr.) Fayod | . | . | . | . | . | . | $2^{2}$ | $1^{2}$ | $2^{1-2}$ | . |
| *Datronia mollis* (Sommerf.: Fr.) Donk | . | . | . | . | . | . | . | $8^{1-2}$ | $x^{2}$ | . |
| *Polyporus melanopus* (Pers.): Fr. | . | . | . | . | . | . | $1^{1}$ | . | $1^{1}$ | . |
| *Coprinus disseminatus* (Pers.: Fr.) Quél. | . | . | . | . | . | . | . | $3^{2-3}$ | $2^{3}$ | . |
| *Polyporus squamosus* (Huds.): Fr. | . | . | . | . | . | . | . | $2^{1-2}$ | $5^{1}$ | . |
| *Bjerkandera adusta* (Willd.: Fr.) P. Karst. | . | . | . | . | . | . | . | $4^{1-2}$ | . | $1^{2}$ |
| *Discina parma* . Breitenb. & Maas Geest. | . | . | . | . | . | . | . | $1^{2}$ | . | $1^{1}$ |
| *Trametes hirsuta* (Wulf.: Fr.) Pilát | . | . | . | . | . | . | $2x^{2}$ | $5^{1-2}$ | . | . |
| *Peniophora quercina* (Pers.: Fr.) Cooke | . | . | . | . | . | . | $2x^{2-3}$ | $5^{2}$ | . | . |
| *Xylaria longipes* Nitschke | . | . | . | . | . | . | $2x^{1-2}$ | $10^{1-2}$ | . | . |
| *Cylindrobasidium laeve* (Pers.: Fr.) Chamuris | . | . | . | . | . | . | $2x^{2}$ | $7^{2}$ | . | . |
| *Nectria cinnabarina* (Tode: Fr.) Fr. | . | . | . | . | . | . | $x^{3}$ | $4^{2-3}$ | . | . |
| *Peniophora incarnata* (Pers.: Fr.) P. Karst. | . | . | . | . | . | . | $x^{2}$ | $4^{2}$ | . | . |
| *Peniophora rufomarginata* (Pers.) Litsch. | . | . | . | . | . | . | $x^{2}$ | $2^{2}$ | . | . |
| *Mycena polygramma* (Bull.: Fr.) Gray | . | . | . | . | . | . | $21^{+-2}$ | $4^{1-2}$ | . | . |
| *Mycena maculata* P. Karst. | . | . | . | . | . | . | $18^{1-3}$ | $4^{2}$ | . | . |
| *Phlebia radiata* Fr. | . | . | . | . | . | . | $14^{1-3}$ | $5^{1-2}$ | . | . |
| *Crepidotus mollis* (Schaeff.: Fr.) Staude | . | . | . | . | . | . | $13^{1-2}$ | $5^{1-2}$ | . | . |

Tab. 2. cont.

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|---|---|---|---|---|---|---|---|---|---|---|
| *Cyathus striatus* (Huds.) Willd.: Pers. | . | . | . | . | . | . | $9^{1-4}$ | $3^{2}$ | . | . |
| *Xerula radicata* (Relh.: Fr.) Dörfelt | . | . | . | . | . | . | $8^{+-2}$ | . | . | . |
| *Schizophyllum commune* Fr.: Fr. | . | . | . | . | . | . | $7^{2}$ | $4^{2}$ | . | . |
| *Pleurotus pulmonarius* (Fr.) Quél. | . | . | . | . | . | . | $7^{+-2}$ | $3^{1-2}$ | . | . |
| *Psathyrella candolleana* (Fr.: Fr.) Maire | . | . | . | . | . | . | $5^{2-3}$ | . | . | . |
| *Polyporus varius* (Pers.): Fr. | . | . | . | . | . | . | $5^{+-1}$ | $3^{+-1}$ | . | . |
| *Polyporus arcularius* (Batsch): Fr. | . | . | . | . | . | . | $4^{+-1}$ | . | | |
| *Encoelia furfuracea* (Roth) P. Karst. | . | . | . | . | . | . | $3^{2}$ | . | . | . |
| *Pluteus salicinus* (Pers.: Fr.) P. Kumm. | . | . | . | . | . | . | $2^{+-1}$ | . | | |
| *Tremella foliacea* Pers. | . | . | . | . | . | . | $2^{1}$ | $2^{1}$ | . | . |
| *Bisporella citrina* (Batsch: Fr.) Korf & S. E. Carp. | . | . | . | . | . | . | $2^{2}$ | $5^{2-3}$ | | |
| *Clavariadelphus fistulosus* (Holmsk.: Fr.) Coener | . | . | . | . | . | . | $2^{1}$ | . | . | . |
| *Genoderma lucidum* (M. A. Curtis: Fr.) P. Karst. | . | . | . | . | . | . | $2^{+}$ | . | . | . |
| *Pleurotus ostreatus* (Jacq.: Fr.) P. Kumm. | . | . | . | . | . | . | $1^{1}$ | $2^{1-2}$ | . | . |
| *Lentinellus cochleatus* (Pers.: Fr.) P. Karst. | . | . | . | . | . | . | $1^{2}$ | $1^{2}$ | . | . |
| *Crucibulum leave* (Huds.) Kambly | . | . | . | . | . | . | $1^{1}$ | . | . | . |
| *Paxillus atrotomentosus* (Batsch: Fr.) Fr. | . | . | . | . | . | . | $1^{+}$ | . | . | . |
| *Xerula pudens* (Pers.) Singer | . | . | . | . | . | . | $1^{2}$ | . | . | . |
| *Bjerkandera fumosa* (Pers.: Fr.) P. Karst. | . | . | . | . | . | . | . | $8^{2}$ | . | . |
| *Panellus stypticus* (Bull.: Fr.) P. Karst. | . | . | . | . | . | . | . | $6^{1-3}$ | . | . |
| *Calocera cornea* (Batsch: Fr.) Fr. | . | . | . | . | . | . | . | $4^{1-2}$ | . | . |
| *Ascocoryne sarcoides* (Jacq.) J. W. Groves & D. E. Wilson | . | . | . | . | . | . | . | $4^{2}$ | . | . |
| *Cerrena unicolor* (Bull.: Fr.) Murrill | . | . | . | . | . | . | . | $4^{2}$ | . | . |
| *Flammulina velutipes* (M. A. Curtis: Fr.) Singer | . | . | . | . | . | . | . | $3^{2-3}$ | . | . |
| *Bulgaria inquinalis* (Pers.) Fr. | . | . | . | . | . | . | . | $2^{2}$ | . | . |
| *Lenzites betulinus* (L.: Fr.) Fr. | . | . | . | . | . | . | . | $2^{2}$ | . | . |
| *Coprinus micaceus* (Bull.: Fr.) Fr. | . | . | . | . | . | . | . | $2^{3-4}$ | . | . |
| *Pleurotus dryinus* (Pers.: Fr.) P. Kumm. | . | . | . | . | . | . | . | $1^{+}$ | . | . |
| *Pycnoporus cinnabarinus* (Jacq.: Fr.) P. Karst. | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Peniophora limitata* (Chaillet: Fr.) Cooke | . | . | . | . | . | . | . | . | $x^{2}$ | $1^{2}$ |
| *Chlorociboria aeruginosa* (Pers.: Fr.) Seaver ex C. S. Ramamuthri, Korf & L. R. Batra | . | . | . | . | . | . | . | . | $2^{+-1}$ | . |
| *Daedaleopsis confragosa* (Bolt.: Fr.) J. Schröt. | . | . | . | . | . | . | . | . | $x^{1}$ | $1^{1}$ |
| *Stereum subtomentosum* Pouzar | . | . | . | . | . | . | . | . | $x^{2}$ | . |
| *Mycena niveipes* Murrill | | | | | | | | | $4^{1-2}$ | |
| *Pluteus nanus* (Pers.: Fr.) P. Kumm. | . | . | . | . | . | . | . | . | $1^{+}$ | . |
| *Hypoxylon fuscum* (Pers.: Fr.) Fr. | . | . | . | . | . | . | . | . | . | $1^{2}$ |
| **Bryophilous fungi** | | | | | | | | | | |
| Number of species | 2 | | 5 | | 5 | | 4 | | 3 | |
| *Galerina hypnorum* (Schrank: Fr.) Kühner | $2^{1}$ | $1^{1}$ | . | . | $27^{+-2}$ | $2^{1}$ | $11^{+-2}$ | $4^{+-1}$ | $10^{1-2}$ | . |
| *Rickenella fibula* (Bull.: Fr.) Raith. | $2^{1}$ | . | . | . | $7^{1-2}$ | $1^{1}$ | $16^{+-2}$ | $2^{1-2}$ | $9^{+-3}$ | . |
| *Mycena acicula* (Schaeff.) P. Kumm. | . | . | . | . | $9^{+-1}$ | . | $17^{+-2}$ | $2^{1}$ | . | . |
| *Galerina paludosa* (Fr.) Kühner | . | . | $14^{+-2}$ | $2^{1-2}$ | . | . | . | . | . | . |
| *Galerina sphagnorum* (Pers.: Fr.) Kühner | . | . | $13^{+-2}$ | . | . | . | . | . | . | . |
| *Psilocybe elongata* (Pers.: Fr.) J. E. Lange | . | . | $10^{+-2}$ | $1^{1}$ | . | . | . | . | . | . |
| *Lyophyllum palustre* (Peck) Singer | . | . | $15^{+-2}$ | $1^{+}$ | . | . | . | . | . | . |
| *Omphalina sphagnicola* (Berk.) M. M. Moser | . | . | . | $1^{+}$ | . | . | . | . | . | . |
| *Galerina mniophila* (Lasch) Kühner | . | . | . | . | $9^{+-1}$ | $2^{1}$ | . | . | . | . |
| *Leotia lubrica* (Scop.) Pers. | . | . | . | . | . | $2^{1-2}$ | . | . | . | . |
| *Rickenella setipes* (Fr.: Fr.) Raith. | . | . | . | . | . | . | $9^{+-1}$ | $2^{1}$ | $7^{+-1}$ | . |
| **Parasitic fungi** | | | | | | | | | | |
| Number of species | 3 | | 3 | | 10 | | 11 | | 5 | |
| *Fomes fomentarius* (L.: Fr.) Kickx | . | . | $x^{1}$ | . | . | $2^{1}$ | $2x^{1}$ | $13^{1-2}$ | . | $1^{1}$ |
| *Fomitopsis pinicola* (Swartz: Fr.) P. Karst. | . | . | $29^{1}$ | $1^{+}$ | $x^{1}$ | $2^{1}$ | $2x^{1-2}$ | $1^{1}$ | . | . |
| *Sparassis crispa* (Wulf.): Fr. | $2^{+}$ | . | . | . | $1^{+}$ | $2^{+-1}$ | . | . | . | . |
| *Heterobasidion annosum* (Fr.) Bref. *ss. lato* | . | $2^{+-1}$ | . | . | $x^{1-2}$ | . | . | . | . | . |
| *Inonotus obliquus* (Pers.: Fr.) Pilát | . | $1^{1}$ | . | $1^{+}$ | . | . | . | . | . | . |
| *Armillaria ostoyae* (Romagn.) Herink | . | . | . | . | $2^{1}$ | $2^{1-2}$ | $5^{2}$ | $4^{1-2}$ | $2^{1-2}$ | . |
| *Laetiporus sulphureus* (Bull.: Fr.) Murrill | . | . | . | . | . | $5^{+-1}$ | $4^{1-2}$ | $2^{+-1}$ | . | . |

Tab. 2. cont.

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|---|---|---|---|---|---|---|---|---|---|---|
| *Tremella encephala* Pers.: Fr. | . | . | . | . | $13^{+-2}$ | $2^{1}$ | . | . | . | . |
| *Phellinus pini* (Brot.: Fr.) A. Ames | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Cordyceps capitata* (Holmskj.: Fr.) Fr. | . | . | . | . | . | $1^{2}$ | . | . | . | . |
| *Cordyceps ophioglossoides* (Ehrh. ex Pers.: Fr.) Fr. | . | . | . | . | . | $1^{1}$ | . | . | . | . |
| *Pholiota squarrosa* (Weigel: Fr.) P. Kumm. | . | . | . | . | . | . | $5^{1}$ | . | $3^{2-4}$ | . |
| *Dumontinia tuberosa* (Hedw.) L. M. Kohn | . | . | . | . | . | . | $2^{2}$ | $1^{1}$ | $4^{1-2}$ | $1^{1}$ |
| *Inonotus radiatus* (Sowerby: Fr.) P. Karst. | . | . | . | . | . | . | . | $1^{3}$ | . | $1^{2}$ |
| *Fistulina hepatica* (Schaeff.): Fr. | . | . | . | . | . | . | $8^{+-1}$ | $2^{+-1}$ | . | . |
| *Phellinus robustus* (P. Karst.) Bourdot & Galzin | . | . | . | . | . | . | $x^{1}$ | $1^{1}$ | . | . |
| *Phellinus alni* (Bondartsev) Parmasto | . | . | . | . | . | . | . | $1^{1}$ | . | . |
| *Asterophora parasitica* (Pers.: Fr.) Singer | . | . | . | . | . | . | . | $1^{2}$ | . | . |

Abbreviations: *P.-P. – Peucedano-Pinetum, V.u.-P. – Vaccinio uliginosi – Pinetum, S.-P. – Serratulo-Pinetum, T.-C. – Tilio-Carpinetum, Fr.-Al. – Fraxino-Alnetum*; pp – permanent plots, cp – complementary plots; 1, 2, 3... – the number of records at a given plot; x – which corresponds to the sum of all observations at a specific plot, is used for species producing permanent fruit-bodies; $^{+-5}$ – the commonly used Moser scale in the quantitative assessment.

Three hundred thirty five taxa of macromycetes were recorded in the phytocoenoses studied. A total of 354 macromycete species were observed between 1997 and 2000. The total number of taxa of macromycete species, including literature data, reported from the area is 506.

***Peucedano-Pinetum*** (W. Mat. 1962) W. Mat. & J. Mat. 1973

Mycological observations in *Peucedano-Pinetum* were conducted in one permanent plot (no. 1) and at 17 supplementary plots. A total of 58 observations in communities classified as *Peucedano-Pinetum* were performed. The occurrence of 73 macromycete species was recorded in the association (Tab. 2). Eleven macromycete species were exclusive of the association in the MLP, which is 15.3% of the mycobiota in *Peucedano-Pinetum*. Those are: *Boletus pinophilus, Chalciporus piperatus, Cortinarius cinnamoneus, Gomphidius roseus, Hygrophorus hypothejus, Leccinum versipelle, L. vulpinum*, *Rozites caperatus, Suillus bovinus, Russula versicolor* and *Tricholoma equestre.* The highest number of species in common was recorded between *Peucedano-Pinetum* and *Serratulo-Pinetum* (60 species, over 83%).

*Peucedano-Pinetum* is an association characteristic of northeastern Poland. It is also known as *Vaccinio myrtilli-Pinetum* Kobendza 1930 (Matuszkiewicz 2001). Macromycetes occurring in *Peucedano-Pinetum*, mostly from the Białowieża Old Growth Forest – *Project CRYPTO*, are reported only sporadically in the available literature (Nespiak 1959; Chmiel, Sadowska 1994; Lisiewska 1995; Bujakiewicz 1995; Chmiel 1995, 1996; Skirgiełło 1995). Mycological observations in *Peucedano-Pinetum* outside the Białowieża Old Growth Forest have been conducted by, for instance, Lisiewska (1991-1992) and Łuszczyński (2007). Data on the mycobiota of *Leucobryo-Pinetum*, which is vicariant with *Peucedano-Pinetum* and which occurs in other parts of Poland, are reported in mycological literature more often (e.g., Lisiewska 1978; Lisiewska, Wójcik 1984; Friedrich 1985, 1994; Ławrynowicz, Szkodzik 1998; Łuszczyński 2007).

The mycobiota of the *Peucedano-Pinetum* phytocoenoses examined in the MLP corresponds to literature data; this is probably related to the characteristic species composition of *Peucedano-Pinetum* and its vicariant *Leucobryo-Pinetum*. Macromycete species associated with *Pinus sylvestris* dominate in both types of coniferous forests.

***Vaccinio uliginosi-Pinetum*** Kleist 1929

Observations in *Vaccinio uliginosi-Pinetum* were conducted in one permanent plot (no. 2) and 2 supplementary plots. A total of 41 observations were performed (Tab. 2). The occurrence of 35 macromycete species, including 13 (37.1%) species exclusive of the community, was recorded in *Vaccinio uliginosi-Pinetum*. Species that occur only in *Vaccinio uliginosi-Pinetum* are as follows: *Cortinarius huronensis, Galerina paludosa, G. sphagnorum, Lactarius helvus, L. thejogalus, Leccinum niveum, Lyophyllum palustre, Omphalina sphagnicola, Psilocybe elongata, Russula betularum, R. emetica* var. *emetica, R. paludosa* and *Rhodocollybia maculata*.

The greatest resemblance of the mycobiota in the association was observed in *Serratulo-Pinetum* (19 species in common between both associations – 54.3% of the biota) and *Peucedano-Pinetum* (17 species in common between both associations – 48.6% of the biota). It is understandable given the coniferous character of the association and the dominance of *Pinus sylvestris*.

The mycobiota of *Vaccinio uliginosi-Pinetum* has been examined in a few mycocoenological studies (e.g. Nespiak 1959; Bujakiewicz 1986; Lisiewska 1978; Kałucka 1995; Friedrich 1997; Łuszczyński 2007). The majority of macromycete species recorded in the association have also occurred in patches of *Vaccinio uliginosi-Pinetum* in other parts of Poland. Those were, for instance, *Cortinarius huronensis, Galerina paludosa, G. sphagnorum, Lactarius helvus, Leccinum niveum, Lyophyllum palustre, Psilocybe elongata, Russula emetica* var. *emetica, R. paludosa* (Bujakiewicz 1986; Kałucka 1995).

***Serratulo-Pinetum*** (W. Mat. 1981) J. Mat. 1988

Macromycetes in *Serratulo-Pinetum* were examined in 2 permanent plots (nos. 6 and 9) and 25 supplementary plots (Tab. 2). A total of 109 observations were performed in the association. The occurrence of 171 macromycete species was recorded. Fifty six species exclusive of the association were found (32.4% of the mycobiota of the association). Those included: *Agaricus silvaticus, Boletus edulis, Chroogomphus rutilus, Clitocybe clavipes, Lactarius deterrimus, Lycoperdon umbrinum, Macrolepiota rhacodes, Mycena zephirus, Russula mustelina, R. xerampelina, Stereum sanguinolentum* or *Strobilurus esculentus*. The mixed tree-stand affects the number of species in common between *Serratulo-Pinetum* phytocoenoses and other plant associations. The greatest number of species in common was recorded in *Tilio-Carpinetum* – 76 species (43.9%) and *Peucedano-Pinetum* – 60 species (34.7%). This is characteristic of a community that exhibits features of both coniferous forests and oak-hornbeam forests and was observed in both permanent plots. The plot with a distinct participation of *Picea abies* (plot 6, tab. 1) exhibits more features of the coniferous forest, which corresponds to fungal species observed in the plot (e.g., *Pseudohydnum gelatinosum, Ramaria abietina, Russula mustelina, Strobilurus esculentus*, etc.). A considerable participation of *Quercus robur* in plot 9 results in its greater affiliation with broadleaved communities, which is reflected in the species composition of macromycetes (e.g., *Cystolepiota seminuda, Tricholoma sulphureum, Hyphodontia paradoxa*, etc.).

Similarly to *Peucedano-Pinetum*, the mycobiota of *Serratulo-Pinetum* is one of the most mycocoenologically under-explored mycobiotas in Poland. The subboreal mixed coniferous forest occurs in northeastern Poland and sporadically in central and eastern Poland. It is known as *Pino-Quercetum serratuletosum* or *Calamagrostio*

*arundinaceae-Piceetum* in older studies from northeastern Poland (Matuszkiewicz 2001). Data on the mycobiota of *Serratulo-Pinetum* are available in studies by Nespiak (1959), Lisiewska (1991-1992) and Łuszczyński (2007). The mycobiota in the *Serratulo-Pinetum* phytocoenosis is intermediate between coniferous communities and oak-hornbeam communities. Species characteristic of both coniferous communities and broadleaved communities occurred there.

***Tilio-Carpinetum*** Tracz. 1962

Macromycetes of oak-hornbeam forests represented by *Tilio-Carpinetum* were observed in 3 permanent plots (nos. 4, 8, 10; Tab. 1) and 23 supplementary plots in the MLP. A total of 169 observations were performed and a total of 198 macromycete species were recorded. No considerable differences in the species composition among individual permanent plots were observed. The mycobiota of *Tilio-Carpinetum* was characterised by the highest participation of exclusive species – 78 ones, that is 39.4% of the mycobiota of the association. *Clavulina coralloides*, *Cylindrobasidium laeve*, *Mycena maculata*, *Peniophora quercinum*, *P. rufomarginata*, *Phlebia radiata, Phellinus robustus*, *Xylaria longipes* were the most frequently recorded species exclusive to oak-hornbeam forests in the MLP. Species exclusive of the oak-hornbeam forest also included: *Amanita phalloides*, *Clavariadelphus fistulosus, Entoloma nidorosum, Fistulina hepatica, Leccinum pseudoscabrum, Macrolepiota procera, Pleurotus pulmonarius, Tricholoma lascivum, Russula risigallina*, *Xerula pudens.*

The greatest similarity was observed between the mycobiota of the oak-hornbeam forest and fungi in *Serratulo-Pinetum* (76 species occurring in both; 38.4% of the mycobiota in the association). The number of species that occurred in *Tilio-Carpinetum* and other broadleaved communities was at a similar level: slightly over 20% of the mycobiota in the association.

The species composition of macromycetes in *Tilio-Carpinetum* has been studied intensely in Poland (e.g., Nespiak 1959; Ławrynowicz 1973; Lisiewska 1978; Gumińska 1991-1992; Skirgiełło 1998; Wojewoda et al. 1999; Ławrynowicz et al. 2002, Łuszczyński 2007). The mycobiota of the association examined in this study differentiates it well from other forest communities investigated in the MLP. The species composition of macromycetes in *Tilio-Carpinetum* is mostly consistent with fungal species occurring in oak-hornbeam phytocoenoses in other parts of Poland.

The analysis shows that the greatest similarity of the species composition and the number of species is observed between the local mycobiota of *Tilio-Carpinetum* in the MLP and the mycobiotas in *Tilio-Carpinetum* recorded in Central Poland (Ławrynowicz 1973) and the Skołczanka Reserve (Gumińska 1991-1992) and in the Tuchola Forests (Ławrynowicz et al. 2002).

***Fraxino-Alnetum*** W. Mat. 1952

The mycobiota of *Fraxino-Alnetum* was examined in one permanent plot (no. 7; Tab. 1) and 2 supplementary plots. A total of 41 mycological observations were performed. 66 species of macromycetes were recorded (Tab. 2). Exclusive species (ten species) constituted 15.2% of the association mycobiota. *Cortinarius paleaceus, Daedaleopsis confragosa, Lactarius lilacinus, Mutinus caninus, Mycena niveipes, M. rubromarginata, Paxillus rubicundulus, Pluteus nanus, Ramaria aurea* and *Stereum subtomentosum* occurred only in *Fraxino-Alnetum* in the MLP. *Fraxino-Alnetum* and *Tilio-Carpinetum* had the greatest number of species in common (46 species, 69.7% of the association biota).

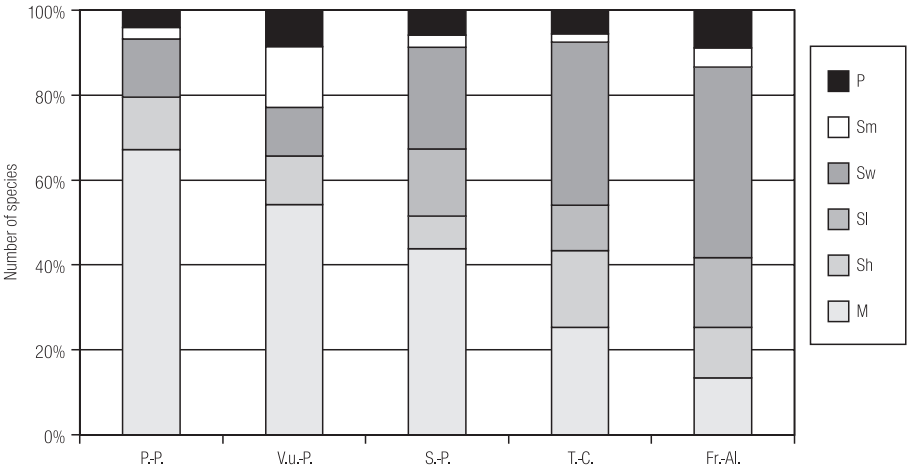


Fig. 2. The participation of bioecological groups of macrofungi in the forest communities of the Masurian Landscape Park.
*P.-P. – Peucedano-Pinetum, V.u.-P. – Vaccinio uliginosi-Pinetum, S.-P. – Serratulo-Pinetum, T.-C. – Tilio-Carpinetum, Fr.-Al. – Fraxino-Alnetum*; M – mycorrhizal fungi, Sh – saprotrophic fungi on humus, Sl – saprotrophic fungi on litter, Sw – saprotrophic fungi on wood, Sm – saprotrophic fungi on mosses, P – parasitic fungi.

Macromycetes in *Fraxino-Alnetum* (=*Circaeo-Alnetum*) have been examined in numerous studies from almost entire Poland (e.g., Nespiak 1959; Bujakiewicz 1969, 1973, 1994; Lisiewska 1978; Friedrich 1985, 1994; Bujakiewicz, Fiebich 1991-1992; Łuszczyński 2007). Species of mycorrhizal fungi characteristic of *Alnus*, *Lactarius lilacinus* and *Cortinarius paleaceus* (Friedrich 1994; Łuszczyński 2007), were recorded in the plot. *Galerina hypnorum* and *Rickenella fibula* were found on mossy trunk bases of alder trees (Łuszczyński 2007). The species composition of macromycetes recorded in *Fraxino-Alnetum* was similar to that of analogous *Fraxino-Alnetum* forests in other parts of Poland. A smaller number of recorded species should be attributed to a limited surface area of permanent plots.

The analysis of participation of individual bioecological groups of macromycetes in the phytocoenoses examined here shows differences between mycorrhizal species and saprotrophic fungi on wood. The greatest participation of mycorrhizal fungi was recorded in *Peucedano-Pinetum* phytocoenoses (66.7% of the mycobiota) and the smallest in *Fraxino-Alnetum* (12.1% of the mycobiota) (Fig. 2). The opposite

Table 3
Number of macrofungi species in plant communities of the Masurian Landscape Park

| Plant community | Total number of macrofungi | Number of species in research plots | | Macrofungi/ plants ratio |
|---|---|---|---|---|
| | | macrofungi | vascular plants | |
| *Peucedano-Pinetum* | 72 | 47 | 19 | 2.47:1 |
| *Vaccinio uliginosi-Pinetum* | 35 | 29 | 16 | 1.81:1 |
| *Serratulo-Pinetum* | 173 | 119 | 41 | 2.90:1 |
| *Tilio-Carpinetum* | 198 | 163 | 43 | 3.79:1 |
| *Fraxino-Alnetum* | 66 | 52 | 26 | 2.00:1 |

ratio was observed for saprotrophic fungi on wood which was only 11.4% for *Vaccinio uliginosi-Pinetum* and 13.9% for *Peucedano-Pinetum* in coniferous associations. Their greatest values were observed for the *Fraxino-Alnetum* phytocoenosis (45.4% for *Fraxino-Alnetum*).

The ratio between the number of macromycete species and the number of plants in permanent plots in the phytocoenoses examined ranges from 1:1.81 for *Vaccinio uliginosi-Pinetum* to 3.79:1 for *Tilio-Carpinetum* (Tab. 3). The data are comparable with the results obtained by Łuszczyński (2007). However, the ratio is 1:1.81 (506 macromycete species : 920 plant species) for the total number of macromycete species recorded in the MLP (the author's observations and literature data) and the number of plant species (Kruszelnicki 1996). However, the observations by Mułenko (1998) and Grzywacz (1999), revealed that the number of fungal species is much greater than the number of plant species when macromycetes are also included.

## SUMMARY

Three hundred and thirty five taxa of macromycetes were recorded in the phytocoenoses examined in the Masurian Landscape Park; 354 macromycete species were observed during examinations conducted in the Park between 1997 and 2000. The total number of species reported from the Masurian Landscape Park, including literature data, is 506.

*Tilio-Carpinetum* (198 taxa) and *Serratulo-Pinetum* (171 taxa) were the richest phytocoenoses in macromycete species. This is confirmed by the relationship between the number of macromycete species occurring in them and the diversified tree-stand (the diversity of substrate available for mycelium development).

Seventy three taxa of macromycetes were recorded in *Peucedano-Pinetum*. The association in the study area is differentiated by a group of exclusive species (15.5% of the mycobiota of the association) such as *Boletus pinophilus, Cortinarius cinnamoneus, Rozites caperatus, Russula versicolor* or *Tricholoma equestre* as well as a group of species that it has in common with the *Serratulo-Pinetum* phytocoenosis (83% of the mycobiota of the association).

The species composition of macromycetes in *Serratulo-Pinetum* is characterised by a high participation of species in common with broadleaved communities (47.9% of the mycobiota in common with *Tilio-Carpinetum*) and with coniferous forests (34.7% of the mycobiota in common with *Peucedano-Pinetum*). 32.4% of exclusive species was recorded in the continental mixed coniferous forest.

A downward trend in the percentage participation of mycorrhizal species from coniferous communities (43-66% of the mycobiota of the associations) to broadleaved communities (12-27% of the mycobiota) was observed. A reverse trend was noted in the case of saprotrophic fungi on wood. The greatest participation of this group was recorded in *Tilio-Carpinetum* (ca 35%) and in *Fraxino-Alentum* (45%), whereas the smallest participation was observed in coniferous forests (11-23%). This probably results from greater diversification of the tree-stand and the richness of available substrate.

REFERENCES

Abromeit J. 1905. Bericht über die 43 Jahresversammlung in Culm am 7. October 1904. Schr. physik.-ökon. Ges. Königsberg 46: 50–83.

Bajkiewicz-Grabowska E. 1989. Charakterystyka geograficzna i klimatyczna Mazurskiego Parku Krajobrazowego oraz podział hydrograficzny na wydzielone zlewnie jeziorne. (In:) A. Hillbricht-Ilkowska (ed.). Jeziora Mazurskiego Parku Krajobrazowego - stan eutrofizacji, kierunki ochrony. Zeszyty Naukowe Komitetu „Człowiek i Środowisko" PAN, 1: 13–20.

Bujakiewicz A. 1969. Udział grzybów wyższych w lasach łęgowych i olesach Puszczy Bukowej pod Szczecinem. Bad. Fizjogr. Pol. Zach., B 23: 61–96.

Bujakiewicz A. 1973. Udział grzybów wyższych w lasach łęgowych i w olesach Wielkopolski. PTPN, Prace Komisji Biol. 25 (6): 1–92.

Bujakiewicz A. 1986. Udział macromycetes w zbiorowiskach roślinnych występujących na podłożu torfowym w Słowińskim Parku Narodowym. Bad. Fizjogr. Pol. Zach., B 37: 101–129.

Bujakiewicz A. 1994. Macrofungi in the alder forests of the Białowieża National Park. Mycologia Helvetica 6 (2): 57–76.

Bujakiewicz A. 1995. Fungi. *Agaricales*. (In:) J. B. Faliński, W. Mułenko (eds). Cryptogamous plants in the forest communities of Białowieża National Park. General problems and taxonomic groups analysis. (Project *CRYPTO* 2). Phytocoenosis 7 (N.S.), Archiv. Geobot. 4: 141–148.

Bujakiewicz A., Fiebich R. 1991-1992. Udział ekologicznych grup macromycetes w płatach olsu w Wielkopolskim Parku Narodowym. Acta Mycol. 27 (1): 63–91.

Chmiel M. A. 1995. Discomycetous fungi. (In:) J. B. Faliński, W. Mułenko (eds). Cryptogamous plants in the forest communities of Białowieża National Park. General problems and taxonomic groups analysis. (Project *CRYPTO* 2). Phytocoenosis 7 (N.S.), Archiv. Geobot. 4: 115–123.

Chmiel M. A. 1996. Litter saprobic fungi. (In:) J. B. Faliński, W. Mułenko (eds). Cryptogamous plants in the forest communities of Białowieża National Park. Functional groups analysis and general synthesis. (Project *CRYPTO* 3). Phytocoenosis 8 (N.S.), Archiv. Geobot. 6: 111–117.

Chmiel M. 2006. Checklist of Polish larger Ascomycetes. (In:) Z. Mirek (ed.). Biodiversity of Poland. 8. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 152 pp.

Chmiel M. A., Sadowska B. 1994. Grzyby koprofilne w zbiorowiskach leśnych Białowieskiego Parku Narodowego. Fragm. Flor. Geobot. Ser. Polonica 1: 107–131.

Dąbrowski St., Polakowski B., Wołos L. 1999. Obszary chronione i pomniki przyrody województwa warmińsko-mazurskiego. Urząd Wojewódzki, Wydział Ochrony Środowiska i Rolnictwa, Olsztyn, 130 pp.

Domański S. 1963. Fungi lignicoli in regione Mazury in Polonia septentrionali annis 1956-1961 collecti. Monogr. Bot. 15: 295–323.

Durska B. 1971. O występowaniu w Polsce *Mycena belliae* (Johnst.) Orton. Acta Mycol. 7 (1): 141–144.

Friedrich S. 1985. Macromycetes na tle zespołów leśnych Puszczy Goleniowskiej. Acta Mycol. 21 (1): 43–76.

Friedrich S. 1994. Charakterystyka socjologiczno-ekologiczna mikoflory zbiorowisk leśnych Cedyńskiego Parku Krajobrazowego. Rozprawy AR Szczecin, 161: 1–100.

Friedrich S. 1997. *Macromycetes* of the proposed nature reserve Wilcze Uroczysko-Olszanka in the Odra estuary. Acta Mycol. 32 (2): 239–255.

Friedrich S. 2000. Ocena metody zastosowanej w badaniach mikologicznych zbiorowisk leśnych Cedyńskiego Parku Krajobrazowego. Folia Univ. Agric. Stetin. 213 Agricultura (85): 95–104.

Grzywacz A. 1999. Gatunkowa różnorodność biologiczna grzybów. Zeszyty Nauk. AR im. H. Kołłątaja w Krakowie 348: 23–38.

Gumińska B. 1991-1992. Higher fungi of the *Tilio-Carpinetum* forest association in the Skołczanka reserve near Cracow. Acta Mycol. 27 (1): 137–158.

Hansen L., Knudsen H. (eds). 2000. Nordic macromycetes. 1. *Ascomycetes*. Nordsvamp, Copenhagen, 309 pp.

Kałucka I. 1995. Macromycetes in the forest communities of the Jodły Łaskie nature reserve (Central Poland). Acta Mycol. 30 (1): 3–26.

Kondracki J. 1998. Geografia regionalna Polski. PWN, Warszawa, 440 pp.

Kotlaba F., Lazebniček J. 1967. IV Sjezd evropských mykologů, Polska 1966. Česká Mycol. 21 (1): 54–59.

Kruszelnicki J. 1996. Ekologiczne podstawy ochrony i kształtowania przyrody Mazurskiego Parku Krajobrazowego. Praca doktorska. IB PAN, Kraków (msc.).

Ławrynowicz M. 1973. Grzyby wyższe makroskopowe w grądach Polski Środkowej. Acta Mycol. 9 (2): 133–204.

Ławrynowicz M., Szkodzik J. 1998. Macromycetes of the Kręgi Kamienne nature-archaeological reserve in the Bory Tucholskie (NW Poland). Acta Mycol. 33 (2): 327–340.

Ławrynowicz M., Dziedziński T., Szkodzik J. 2002. Macromycetes of *Aceri-Tilietum* and *Tilio-Carpinetum* in the „Dolina Rzeki Brdy" nature reserve in the Bory Tucholskie (NW Poland). Acta Mycol. 37 (1/2): 63–76.

Lisiewska M. 1965. Udział grzybów wyższych w grądach Wielkopolski. Acta Mycol. 1: 169-269.

Lisiewska M. 1978. Macromycetes na tle zespołów leśnych Świętokrzyskiego Parku Narodowego. Acta Mycol. 14 (1/2): 163–191.

Lisiewska M. 1991-1992. Flora macromycetes rezerwatu „Perkuć" w Puszczy Augustowskiej. Acta Mycol. 27 (2): 175–187.

Lisiewska M. 1995. Tremelloid fungi, *Boletales, Elaphomycetales*. (In:) J. B. Faliński, W. Mułenko (eds). Cryptogamous plants in the forest communities of Białowieża National Park. General problems and taxonomic groups analysis.(Project *CRYPTO* 2). Phytocoenosis 7 (N.S.), Archiv. Geobot. 4: 129–131, 137–140, 153.

Lisiewska M. 2000. Udział bioekologicznych grup macromycetes w zbiorowiskach acidofilnych dąbrów na Płycie Krotoszyńskiej w południowej Wielkopolsce. (In:) M. Lisiewska, M. Ławrynowicz (eds). Monitoring grzybów. PTB, Sekcja Mikologiczna, Poznań-Łódź: 27–51.

Lisiewska M., Wójcik J. 1984. Obserwacje mikosocjologiczne w niektórych zbiorowiskach leśnych okolic Kazimierza Biskupiego (województwo konińskie). Bad. Fizjogr. Pol. Zach., B 35: 25–34.

Łuszczyński J. 2007. Diversity of *Basidiomycetes* in various ecosystems of the Góry Świętokrzyskie Mts. Monogr. Bot. 97: 1–218.

Matuszkiewicz J. M. 2001. Zespoły leśne Polski. PWN, Warszawa, 357 pp.

Mirek Z., Piękoś-Mirkowa H., Zając A., Zając M. 2002. Flowering plants and pteridophytes of Poland, a checklist. (In:) Z. Mirek (ed.). Biodiversity of Poland. 1. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 442 pp.

Mułenko W. 1998. Mikroskopijne grzyby fitopatogeniczne w strukturze naturalnych zbiorowisk leśnych. Rozprawy habilitacyjne LXII. Wyd. UMCS, Lublin, 188 pp.

Nespiak A. 1959. Studia nad udziałem grzybów kapeluszowych w zespołach leśnych na terenie Białowieskiego Parku Narodowego. Monogr. Bot. 8: 3–141.

Neuhoff W. 1933. Die Hymenomyceten Ostpreussens. Eine systematische Zusammenstellung. Unser Ostland 2 (7): 317–397.

Ochyra R., Żarnowiec J., Bednarek-Ochyra H. 2003. Census catalogue of Polish Moses. Biodiversity of Poland. 3. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 372 pp.

Olesiński L., Wojewoda W. 1985. Materiały do flory macromycetes północno-wschodniej Polski. Acta Mycol. 21 (2): 193–232.

Orłoś H., Dominik T. 1960. Z biologii huby korzeniowej – *Fomes annosus* (Fr.) Cooke. Sylwan 104: 1–13.

Polakowski B., Chudyba H., Dąbek E., Dziedzic J., Jutrzenka-Trzebiatowski A., Korniak T., Pietraszewski W. 1976. Zarys stosunków geobotanicznych Mazurskiego Parku Krajobrazowego. I. Zespoły roślinne parku. Zesz. Nauk. ART. Olszt., Rolnictwo 18: 31–40.

Polakowski B., Jutrzenka-Trzebiatowski A., Hołdyński Cz. 1997. Roślinność rzeczywista Mazurskiego Parku Krajobrazowego. Wydawnictwo ART. Olsztyn, ss. 40 + mapa 1:30 000.

Skirgiełło A. 1968. Compte-rendu du IV-eme Congres des Mycologues Européens. Warszawa 1966. Acta Mycol. 4 (2): 243–249.

Skirgiełło A. 1995. Gasteromycetous fungi, *Aphyllophorales, Russulales, Mucorales*. (In:) J. B. Faliński, W. Mułenko (eds). Cryptogamous plants in the forest communities of Białowieża National Park. General problems and taxonomic groups analysis. (Project *CRYPTO* 2). Phytocoenosis 7 (N.S.), Archiv. Geobot. 4: 125–128, 133–136, 149–151, 155–157.

Skirgiełło A. 1998. Macromycetes of oak-hornbeam forests in the Białowieża National Park – monitoring studies. Acta Mycol. 33 (2): 171–189.

Wojewoda W. 2003. Checklist of Polish larger Basidiomycetes. (In:) Z. Mirek (ed.). Biodiversity of Poland. 7. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków, 812 pp.

Wojewoda W., Heinrich Z., Komorowska H. 1999. Macromycetes of oak-lime-hornbeam woods in the Niepołomnice Forest near Kraków (S Poland) – monitoring studies. Acta Mycol. 34 (2): 201–266.

# Udział macromycetes w wybranych zbiorowiskach leśnych Mazurskiego Parku Krajobrazowergo

Streszczenie

W latach 1997–2000 na terenie Mazurskiego Parku Krajobrazowego prowadzono badania mikosocjologiczne, dotyczące występowania grzybów wielkoowocnikowych (macromycetes). W niniejszej pracy przedstawiono charakterystykę mikosocjologiczną 5, wybranych zespołów leśnych: *Peucedano-Pinetum, Vaccinio uliginosi-Pinetum, Serratulo-Pinetum, Tilio-Carpinetum* oraz *Fraxino-Alnetum*. Zastosowano ogólnie przyjętą metodę prowadzania badań mikosocjologicznych. Wielkość pojedynczej powierzchni wynosiła 400 $m^2$.

W prezentowanych fitocenozach stwierdzono występowanie 335 taksonów macromycetes. Na terenie Parku, w trakcie badań własnych, odnotowano łącznie 354 taksony macromycetes, co z danymi z literatury daje łącznie 506 taksonów, których występowanie stwierdzono na obszarze Mazurskiego Parku Krajobrazowego.

W trakcie obserwacji mikologicznych określono skład gatunkowy badanych zespołów leśnych Parku. Najbogatsze w gatunki macromycetes okazały się fitocenozy *Tilio-Carpinetum* (198 taksonów) oraz *Serratulo-Pinetum* (171 taksony). Potwierdza to związek liczby występujących gatunków grzybów wielkoowocnikowych z bogatym drzewostanem – różnorodność dostępnego substratu dla rozwoju grzybni.

Prześledzono udział grzybów z poszczególnych grup bioekologicznych w badanych zbiorowiskach leśnych. Gatunki mikoryzowe stanowią od 43 do 66 % mikobioty badanych zbiorowisk borowych. W zespołach lasowych udział ich sięga niespełna 27% mikobioty badanych fitocenoz. Odwrotna tendencja zaznaczyła się w przypadku saprotrofów nadrewnowych. Największy udział grupa ta miała w grądach (ok. 35%) i łęgach (45%), najmniejszy w borach (11-23%). Potwierdza to związek liczby gatunków nadrewnowych z bogactwem dostępnego substratu (zróżnicowany drzewostan).