

**MACROMYCETES AND MYXOMYCETES OF ASVEJA REGIONAL PARK (LITHUANIA)**
**Reda IRŠĖNAITĖ\***, **Gražina ADAMONYTĖ**<sup>1</sup>, **Inita DANIELE**<sup>2</sup>, **Jonas KASPARAVIČIUS**<sup>1</sup>, **Ernestas KUTORGA**<sup>3</sup>, **Darius STONČIUS**<sup>4</sup>
<sup>1</sup>Nature Research Centre, Institute of Botany, Žaliojių Ežerų Str. 49, LT-08406 Vilnius, Lithuania

<sup>2</sup>Natural History Museum of Latvia, K. Barona Str. 4, LV-1050 Riga, Latvia

<sup>3</sup>Vilnius University, Department of Botany and Genetics, M. K. Čiurlionio Str. 21/27, LT-03101 Vilnius, Lithuania

<sup>4</sup>Lithuanian Fund for Nature, Algirdo Str. 22–3, LT-03218 Vilnius, Lithuania

\* Corresponding author. E-mail: reda.irsenaite@botanika.lt

**Abstract**

Iršėnaitė R., Adamonytė G., Daniele I., Kasparavičius J., Kutorga E., Stončius D., 2013: Macromycetes and myxomycetes of Asveja Regional Park (Lithuania) [Asvejos regioninio parko (Lietuva) makromicetai ir gleivūnai]. – Bot. Lith., 19(1): 8–21.

The paper provides data on macromycete and myxomycete species diversity and distribution in Asveja Regional Park located in eastern Lithuania. A total of 326 species of macromycetes and 33 species and intraspecific taxa of myxomycetes were recorded. Five species, *Eocronartium muscicola*, *Mycena megaspora*, *Neobulgaria pura*, *Pachyella violaceonigra* and *Skeletocutis papyracea*, were reported for the first time in Lithuania. Twenty species listed in the Red Data Book of Lithuania were recorded during this study. Distribution and habitats of rare and endangered fungus and myxomycete species are discussed.

**Keywords:** fungi, slime molds, fungal conservation, protected areas, woodland key habitats.

**INTRODUCTION**

Mycological investigations in protected areas of Lithuania have long-lasting traditions; however, the macromycetes and myxomycetes have been thoroughly studied only in few of them, e.g. in Žalieji Ežerai Landscape Reserve (URBONAS et al., 1985) and Viešvilė State Strict Nature Reserve (ADAMONYTĖ, 2001; URBONAS & JARMALAVIČIENĖ, 2001; KUTORGA, 2002; KUTORGA & RAITVIIR, 2003). Preliminary investigations on macromycetes, mainly agaricoid fungi, have been carried out in Čepkeliai State Strict Nature Reserve (URBONAS, 1984) and Aukštaitija National Park (URBONAS, 1988). The diversity and conservation of ascomycetes and basidiomycetes have been studied in Dusetos Forest, Sartai Regional Park (IRŠĖNAITĖ, 2004).

Fungi are regarded as key elements of nutrient cy-

cles of terrestrial ecosystems, decomposing organic matter and making it available to plants (SWIFT et al., 1979) and forming mutualistic symbioses with many tree species in forest habitats and thus contributing to tree nutrition (SMITH & READ, 2008). Understanding and documenting of fungal biodiversity is essential and, therefore, it should be considered in the selection, evaluation and management of protected areas (SENN-IRLET et al., 2007; PERINI et al., 2008; DAHLBERG et al., 2010).

Lithuania has 30 regional parks, which have been established to protect exceptional natural and cultivated areas as well as cultural heritage. Regional parks make up 54% (446 thousand ha) of all protected areas (BAŠKYTĖ et al., 2006). One of these is Asveja Regional Park situated in the eastern part of Lithuania. It constitutes a large complex of various forest types, lakes, marshes and agricultural lands and provides

diverse habitats for many organisms, including fungi and slime molds. Preliminary mycological studies carried out in this regional park on a limited number of localities showed rather diverse and rich mycobiota in different habitats. Nevertheless, no detailed documentation of it has ever been performed until now. Therefore, the aim of this paper is to summarise the results of the preliminary inventory of macromycetes and myxomycetes in different habitats of Asveja Regional Park. The summarised data on species diversity and distribution will make a baseline for further studies and monitoring of mycobiota and general biodiversity and will help in selecting and managing biologically rich sites in the park.

## MATERIALS AND METHODS

### Study area and localities

Asveja Regional Park is located in eastern Lithuania, encompassing territories belonging to Molėtai, Švenčionys and Vilnius administrative districts. The park covers 12 208 hectares, including forests (56%),

water bodies (16%), mires (2%), agricultural lands and villages (26%) (BAŠKYTĖ et al., 2006). The most important feature is the longest tunnel-valley lake in Lithuania – Lake Asveja; there are also a number of streams with natural watercourses and several mire complexes. Forest vegetation is dominated by medium-aged *Pinus sylvestris* stands on sandy soil. *Alnus glutinosa* woods are situated in depressions, while broad-leaved trees such as *Quercus robur*, *Fraxinus excelsior* grow on the slopes of lakes and rivers. Large fragments of old *Quercus robur* and other hardwood stands are found in Šakymas Forest and in the environs of Lake Baluošai. Considering old age (~100–200 years) of the dominant trees, the structure of vegetation and low degree of disturbance, Šakymas Forest is one of a few old-growth broad-leaved forests still surviving in Lithuania. Smaller fragments and solitary ancient trees are found in the whole territory of the park. The largest old-growth black alder stands are located in Purviniškiai wetland complex.

The material was collected in the following localities of Asveja Regional Park (Fig. 1).



Fig. 1. Collection localities in Asveja Regional Park

Locality No. 1: Valley of the Žverna rivulet (55° 03' N, 25° 34' E) is situated in Molėtai administrative district, Dubingiai Forest district, forest compartments No. 31–33. Žverna Hydrographical Reserve was established for the conservation of natural features of the forest rivulet (0.8 km long) and its valley. Broad-leaved forest with common oak (*Quercus robur*) dominates in the valley. Woodland key habitats of broad-leaved forests and wetland forests were inventoried in this site (ANDERSSON et al., 2005).

Locality No. 2: Blužnėnai Forest (55° 00' N, 25° 39' E) is situated in Švenčionys administrative district, Purviniškiai Forest district, forest compartments No. 135, 136, 139, 140, 789. Wetland forests with black alder (*Alnus glutinosa*) and spruce (*Picea abies*), interspersed with patches of old oak (*Quercus robur*) stands predominate. A woodland key habitat of wetland forest type was inventoried in this site (ANDERSSON et al., 2005).

Locality No. 3: Valley of the Jurkiškis rivulet (55° 04' N, 25° 25' E) is situated in Molėtai administrative district, Dubingiai Forest district, forest compartments No. 1071, 1077, 1124, between two lakes – Asveja and Suoselis. Beds of the rivulets are stony, steep and high slopes are overgrown with deciduous stands, where old trees (especially *Fraxinus excelsior*) dominate.

Locality No. 4: Šakymas Forest (55° 02' N, 25° 29' E) is situated in Molėtai administrative district, Dubingiai Forest district, forest compartments No. 65, 66, 70, 71. In this forest, Šakymas Strict Nature Reserve (141 ha area) was established in 1995 for the conservation of old deciduous forest, specifically oak (*Quercus robur*) stands. Old-growth hardwood forest composed of mature oaks, maples (*Acer platanoides*) and ashes (*Fraxinus excelsior*) with a mosaic of mires and slopes overgrown with pines (*Pinus sylvestris*) make a wide variety of habitats suitable for a number of rare and threatened organisms.

Locality No. 5: Dubingiai hillfort (55° 03' N, 25° 26' E) is situated in Dubingiai village. The slopes of the hillfort are covered with old broad-leaved trees such as *Fraxinus excelsior*, *Quercus robur*, *Acer platanoides* and *Tilia cordata*.

Locality No. 6: Žingiai Forest (55° 00' N, 25° 34' E) is situated in Vilnius district, Sužionys Forest district, forest compartments No. 736 and 738. The detailed survey was carried out in the western part of the forest

and the surveyed area covers 23 ha. The forest is dominated by secondary stands of birch (*Betula* spp.), white alder (*Alnus incana*), pine and spruce plantations aged 50–60 years. The studied area was a wooded meadow or a pasture before the World War II. More than forty oaks aged 130–140 years with wide canopies form the oldest generation of trees in the forest.

Locality No. 7: a steep slope to the southeast of Lake Ilgis (54° 58' N, 25° 39' E) is situated in Vilnius administrative district, Pabradė Forest district, the forest compartment No. 45. The slope is covered with old broad-leaved trees such as *Fraxinus excelsior*, *Quercus robur* and *Acer platanoides*.

Locality No. 8: a steep slope to the south of Lake Viranglis (55° 01' N, 25° 30' E) is situated in Vilnius district, Sužionys Forest district, the forest compartment No. 41. It is overgrown with young *Alnus incana*, *Fraxinus excelsior* and scattered old *Fraxinus excelsior*, *Quercus robur* and *Acer platanoides* trees.

Locality No. 9: a temporarily flooded swamp forest (55° 00' N, 25° 36' E) is situated in Švenčionys administrative district, Purviniškiai Forest district, the forest compartment No. 133. The water level in the forest depends on fluctuations of water level in Lake Asveja. The site is dominated by middle-aged deciduous stands of *Betula* spp. with admixture of *Alnus glutinosa*.

### Field sampling

The study material of macromycetes and myxomycetes in localities No. 1–3 and No. 5 was collected by the authors of this paper, and by M. Kukwa and Ž. Preikša during the field trips of the 18<sup>th</sup> Symposium of the Baltic Mycologists and Lichenologists held in Dubingiai 19–23 September 2011 (ADAMONYTĖ & MOTIEJŪNAITĖ, 2011). Collecting of macromycetes in Žingiai Forest (locality No. 6) was undertaken by R. Iršėnaitė and D. Stončius during August–October 2007–2008. Data from other localities (No. 4, 7–9) were collected mainly by D. Stončius during the inventory and monitoring of woodland key habitats in 2004–2010 (ANDERSSON et al. 2005). Voucher specimens are deposited at the Herbaria of the Institute of Botany of Nature Research Centre (BILAS) and Vilnius University (WI), and at the Natural History Museum of Latvia.

### Compilation of the list of taxa

For each fungus the information is given in the following order: scientific name, synonym (when used

in Lithuanian literature), data on substratum, habitat and locality number. Taxa of *Ascomycota*, *Basidiomycota* and *Myxomycota* are treated separately in alphabetical order. Taxonomy and nomenclature of macromycetes are based on *Funga Nordica* (KNUDSEN & VESTERHOLT, 2008) and Index Fungorum database (<http://www.indexfungorum.org>), and that of myxomycetes after LADO (2005–2012). New species to Lithuania are marked with an asterisk (\*). Species listed in the Red Data Book of Lithuania (IRŠĖNAITĖ, KASPARAVIČIUS, 2007; KUTORGA, 2007) are typed in bold.

## RESULTS

### List of taxa

#### **ASCOMYCOTA**

*Aleuria aurantia* (Pers.) Fuckel – on soil; 6.

*Ascocoryne cylichnium* (Tul.) Korf – on dead wood of *Quercus robur* stump and *Fraxinus excelsior* trunk; 2, 3.

*Ascocoryne sarcoides* (Jacq.: Fr.) Groves & D. E. Wilson – on dead wood; 2, 6.

*Bisporella citrina* (Batsch) Korf & S.E.Carp. – on deciduous dead wood; 1, 2, 3, 6.

***Caloscypha fulgens*** (Pers.) Boud. – on soil in wet *Betula* sp. stand; 9.

*Chlorociboria aeruginascens* (Nyl.) Kanouse – on dead wood of deciduous tree; 1, 2, 3, 6.

*Dumontinia tuberosa* (Bull.) L.M.Kohn – on old tubers of *Anemone* sp.; 6.

*Geoglossum umbratile* Sacc. – on soil among herbs; 1.

*Gyromitra gigas* (Krombh.) Cooke – on soil; 6.

*Gyromitra infula* (Schaeff.) Quél. – on decaying wood of *Picea abies* trunks and stumps; 2.

*Helvella ephippium* Lév. – on soil; 1.

*Helvella macropus* (Pers.) P.Karst. – on soil under deciduous trees and conifers; 6.

*Hymenoscyphus virgultorum* (Wahl) W.Phillips – on fallen twigs of *Corylus avellana*; 3.

*Hypoxylon fuscum* (Pers.) Fr. – on *Corylus avellana* branches; 6.

*Hypoxylon multiforme* (Fr.) Fr. – on *Betula* sp. fallen trunk; 2, 6.

*Lachnum brevipilosum* Baral – on dead wood of *Fraxinus excelsior*; 3.

*Lanzia luteovirescens* (Roberge ex Desm.) Dumont & Korf – on fallen petioles of *Tilia cordata*; 3.

*Leotia lubrica* (Scop.) Pers. – on soil under deciduous trees; 1, 3.

*Miladina lecithina* (Cooke) Svrček – on water-soaked wood of *Fraxinus excelsior*; 3.

*Mollisia cinerea* (Batsch) P.Karst. – on dead wood of deciduous trees; 2, 3, 6.

*Nectria cinnabarina* (Tode.) Fr. – on twigs of deciduous trees; 2, 6.

\**Neobulgaria pura* (Pers.) Petr. – on water-soaked wood of *Fraxinus excelsior*; 3.

*Otidea leporina* var. *minor* Rehm – on soil; 6.

*Pachyella babingtonii* (Berk.) Boud. – on water-soaked *Fraxinus excelsior* trunk; 3.

\**Pachyella violaceonigra* (Rehm) Pfister – on water-soaked wood of *Quercus robur*; on wet wood and bark of *Fraxinus excelsior* trunk; 1, 3.

*Peziza succosa* Berk. – on soil; 1.

*Pseudoplectania nigrella* (Pers.) Fuckel – on litter; 6.

*Sarcoscypha austriaca* (Berk & Sacc.) Boud. – on twigs of deciduous tree; 6.

*Scutellinia nigrohirtula* (Svrček) Le Gal – on water-soaked wood of *Fraxinus excelsior* branch; 3.

*Scutellinia scutellata* (L.) Lambotte – on dead wood of deciduous tree; 6.

*Tarzetta cupularis* (L.) Svrček – on soil; 1.

*Tympanis alnea* (Pers.) Fr. – on dead *Alnus incana* trunk hanging over the riverbed; 3.

***Urnula craterium*** (Schwein.) Fr. – on dead buried branches of deciduous tree; 4.

*Ustulina deusta* (Hoffm.) Grev. – on *Acer* sp. fallen trunk; 6.

*Xylaria hypoxylon* (L.) Grev. – on dead wood of deciduous tree; 6.

#### **BASIDIOMYCOTA**

*Agaricus abruptibulbus* Peck – on soil, under conifers; 6.

*Agrocybe erebia* (Fr.) Kühner ex Singer – on soil among herbs; 3.

*Amanita citrina* (Schaeff.) Pers. – on soil, under conifers and deciduous trees; 2, 6.

*Amanita fulva* (Schaeff.) Fr. – on soil, under deciduous trees; 6.

*Amanita muscaria* (L.) Hook. – on soil, under deciduous trees and conifers; 2, 6.

- Amanita porphyria* Fr. – on soil, under conifers; 2, 6.
- Amanita rubescens* (Pers.) Gray – on soil, under deciduous trees and conifers; 6.
- Amanita vaginata* (Bull.) Lam. – on soil, under deciduous trees; 2, 6.
- Amanita virosa* (Fr.) Bertill. – on soil, under conifers; 6.
- Amphinema byssoides* (Pers.) J.Erikss. – on dead wood of conifers and deciduous trees; 2, 6.
- Ampulloclitocybe clavipes* (Pers.) Redhead, Lutzoni, Moncalvo & Vilgalys (= *Clitocybe clavipes* (Pers.) P.Kumm.) – on soil, under deciduous and coniferous trees; 2, 6.
- Antrodia serialis* (Fr.) Donk. – on dead wood of coniferous trees; 2, 6.
- Antrodia sinuosa* (Bull.) Murrill – on dead wood of coniferous and deciduous trees; 2, 6.
- Antrodiella semisupina* (Berk. & M.A.Curtis) Ryvarden – on fallen branch of *Corylus avellana*; 6.
- Antrodiella serpula* (P.Karst.) Spirin & Niemelä – on old fruitbodies of *Inonotus radiatus* growing on stumps of *Corylus avellana* and *Alnus glutinosa*; 1, 2.
- Armillaria mellea* (Vahl) P.Kumm. s. l. – on dead wood of conifers and deciduous trees; 6.
- Artomyces pyxidatus* (Pers.) Jülich – on dead wood of deciduous trees; 6.
- Athelia epiphylla* Pers. – on fallen trunk of *Betula* sp.; 6.
- Bjerkandera adusta* (Willd.) P.Karst. – on fallen branches of deciduous trees; 2, 3, 6.
- Boletus edulis* Bull. – on soil, under conifers and deciduous trees; 2, 6.
- Botryobasidium laeve* (J.Erikss.) Parmasto – on branches of *Picea abies*; 6.
- Botryohypochnus isabellinus* (Fr.) J.Erikss. – on fallen trunk of *Betula*; 6.
- Bulbillomyces farinosus* (Bres.) Jülich – on twigs and branches of *Alnus glutinosa*; 6.
- Byssomerulius corium* (Pers.) Parmasto – on fallen branches of *Corylus avellana*; 6.
- Calocera cornea* (Batsch) Fr. – on fallen trunks and branches of coniferous trees; 6.
- Calocera viscosa* Pers. – on stump of *Picea abies*; 2, 6.
- Cantharellus cibarius* Fr. – on soil, under coniferous and deciduous trees; 1, 2, 6.
- Cantharellus lutescens* (Pers.) Fr. (= *Craterellus lutescens* (Fr.) Fr.) – on soil; 1.
- Ceraceomyces serpens* (Tode) Ginns – on stump of *Picea abies*; 6.
- Clavaria falcata* Pers. – on soil and litter, under deciduous trees; 1.
- Clavaria zollingeri* Lev. – on soil and litter, under deciduous trees; 1.
- Clavulina coralloides* (L.) J.Schröt. – on soil and litter, under deciduous trees; 6.
- Clavulinopsis corniculata* (Schaeff.) Corner – on soil and litter; under deciduous trees; 1.
- Clavulinopsis helvola* (Pers.) Corner – on soil and litter; under deciduous trees; 3.
- Clitocybe metachroa* (Fr.) P.Kumm. – on soil, under conifers and deciduous trees; 6.
- Clitocybe nebularis* (Batsch) P.Kumm. – on soil, under conifers and deciduous trees; 2, 6.
- Clitocybe odora* (Bull.) P.Kumm. – on soil, under deciduous trees; 2, 6.
- Clitocybe phyllophila* (Pers.) P.Kumm. – on soil, under *Picea abies*; 6.
- Clitocybe rivulosa* (Pers.) P.Kumm. (= *C. dealbata* (Sowerby) Gillet) – on soil, near path; 6.
- Collybia cookei* (Bres.) J.D.Arnold – on disintegrated fruitbodies of agaricoid fungi; 6.
- Coltricia perennis* (L.) Murrill – on sandy soil, under *Pinus sylvestris* and *Betula* sp.; 6.
- Coprinellus disseminatus* (Pers.) J.E.Lange (= *Coprinus disseminatus* (Pers.) Gray) – on trunk base of *Betula* sp.; 6.
- Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq.Johnson (= *Coprinus micaceus* (Bull.) Fr.) – on *Betula* sp. trunk; 6.
- Cortinarius armillatus* (Fr.) Fr. – on soil, under *Betula* sp.; 6.
- Cortinarius brunneus* (Pers.) Fr. – on soil, under *Picea abies*; 6.
- Cortinarius sanguineus* (Wulfen) Fr. – on soil, under coniferous trees; 2.
- Cortinarius semisanguineus* (Fr.) Fr. – on soil, under *Pinus sylvestris*; 6.
- Cortinarius torvus* (Fr.) Fr. – on soil, under deciduous trees; 6.
- Cortinarius varius* (Schaeff.) Fr. – on soil, under *Picea abies*; 6.
- Cortinarius violaceus* (L.) Gray – on soil, under deciduous trees; 2, 4.
- Crepidotus mollis* (Schaeff.) Staude – on fallen trunk of *Quercus robur*; 6.

- Crepidotus variabilis* (Pers.) P.Kumm. – on fallen branches of deciduous trees; 6.
- Crucibulum laeve* (Huds.) Kambly – on fallen trunk of deciduous tree; 1.
- Cystoderma amianthinum* (Scop.) Fayod – on soil, under deciduous trees; 6.
- Cystoderma carcharias* (Pers.) Fayod – on soil, under conifers; 6.
- Cystoderma granulosum* (Batsch) Fayod – on soil, along paths; 6.
- Dacrymyces stillatus* Nees – on dead wood of coniferous trees; 2, 6.
- Daedalea quercina* (L.) Pers. – on stump and fallen trunk of *Quercus robur*; 2, 6.
- Daedaleopsis confragosa* (Bolt.) Schröt. – on fallen branches of *Populus tremula*, *Betula* sp.; 6.
- Echinoderma asperum* (Pers.) Bon (= *Lepiota aspera* (Pers.) Quél.) – on soil; 1.
- Entoloma euchroum* (Pers.) Donk – on dead wood of deciduous tree; 2.
- Entoloma incanum*** (Fr.) Hesler – on soil among grasses; 3.
- Entoloma nitidum* Quél. – on soil, under deciduous trees and conifers; 2.
- Entoloma serrulatum* (Fr.) Hesler – on soil among grasses; 1.
- \**Eocronartium muscicola* (Pers.) Fitzp. – on mosses under conifers; 6.
- Exidia glandulosa* (Bull.) Fr. – on dead wood of deciduous trees; 2, 6.
- Exidia truncata* Fr. – on dead wood of deciduous trees; 6.
- Fistulina hepatica*** (Schaeff.) With. – on trunk of living *Quercus robur*; 5.
- Fomes fomentarius* (L.) J.J.Kickx – on dead wood of deciduous trees; 1, 2, 3, 4, 6.
- Fomitopsis pinicola* (Sw.) P.Karst. – on fallen trunks of *Picea abies*; 1, 2, 3, 6.
- Funalia trogii*** (Berk.) Bondartsev & Singer – on fallen trunk of *Fraxinus excelsior*; 4.
- Galerina camerina* (Fr.) Kühner – on dead wood; 6.
- Galerina hypnorum* (Schrank) Kühner – on mosses; 6.
- Galerina triscopa* (Fr.) Kühner – on fallen trunk of *Picea abies*; 6.
- Ganoderma lipsiense* (Batsch) Atk. – on dead wood of deciduous and coniferous trees; 2, 6.
- Geastrum fimbriatum* Fr. – on soil and litter, under conifers and deciduous trees; 6.
- Gloeophyllum sepiarium* (Wulfen) P.Karst. – on fallen trunk of *Picea abies*; 6.
- Gloeoporus dichrous* (Fr.) Bres. – on fallen trunk of *Alnus glutinosa*; 6.
- Gloeoporus pannocinctus* (Romell) J.Erikss. – on fallen trunk of *Alnus glutinosa*; 6.
- Gomphidius glutinosus* (Schaeff.) Fr. – on soil, under *Picea abies*; 6.
- Grifola frondosa*** (Dicks.) Gray – on soil nearby living *Quercus robur* and snag; 2, 6.
- Gymnopilus penetrans* (Fr.) Murrill – on dead coniferous wood; 6.
- Gymnopus acervatus* (Fr.) Murrill (= *Collybia acervata* (Fr.) P.Kumm.) – on dead rotten wood of conifers; 6.
- Gymnopus androsaceus* (L.) J.L.Mata & R.H.Petersen (= *Marasmius androsaceus* (L.) Fr.) – on litter and wood; 6.
- Gymnopus confluens* (Pers.) Antonín, Halling & Noordel. (= *Collybia confluens* (Pers.) P.Kumm.) – on litter, under deciduous and coniferous trees; 2, 6.
- Gymnopus dryophilus* (Bull.) Murrill (= *Collybia dryophila* (Bull.) P.Kumm.) – on litter, under deciduous trees; 2, 6.
- Gymnopus peronatus* (Bolton) Gray (= *Collybia peronata* (Bolton) P.Kumm.) – on litter, under conifers and deciduous trees; 2, 6.
- Gyroporus cyanescens* (Bull.) Quél. – on soil, under *Betula*, *Picea abies*; 6.
- Hapalopilus croceus*** (Pers.) Bondartsev & Singer – on trunk of living *Quercus robur*; 2.
- Hemimycena lactea* (Pers.) Singer – on litter, under conifers; 6.
- Hericium coralloides*** (Scop.) Pers. – on trunk of *Acer platanoides*; 1, 2.
- Heterobasidium parviporum* Niemelä & Korhonen – on fallen trunk of *Picea abies*; 6.
- Hydnum repandum* L. – on soil; 1.
- Hygrocybe conica* (Schaeff.) P.Kumm. – on soil, under conifers and deciduous trees; 1, 2, 3.
- Hygrocybe miniata* (Fr.) P.Kumm. – on soil, under deciduous trees; 1.
- Hygrocybe virginea* (Wulfen) P.D.Orton & Watling (= *Camarophyllum virgineus* (Wulfen) P.Kumm.) – on soil among grasses, 1, 3.
- Hygrophoropsis aurantiaca* (Wulfen) Maire – on

soil, under conifers; 6.

*Hygrophorus agathosmus* (Fr.) Fr. – on soil, under conifers; 1.

*Hygrophorus eburneus* (Bull.) Fr. – on soil, under deciduous trees; 2.

*Hygrophorus nemoreus* Fr. – on soil, under deciduous trees; 1.

*Hygrophorus pustulatus* (Pers.) Fr. – on soil, under *Picea abies*; 6.

*Hymenochaete rubiginosa* (Fr.) Lév. – on stumps and branches of *Quercus robur*; 2, 6.

*Hymenochaete tabacina* (Fr.) Lév. – on dead wood of deciduous tree; 6.

*Hyphoderma mutatum* (Peck) Donk – on fallen trunk of *Malus*; 6.

*Hyphodontia breviseta* (P.Karst.) J.Erikss. – on dead wood; 1, 2, 3, 6.

*Hyphodontia quercina* (Pers.) J.Erikss. – on dead branches of *Corylus avellana*, *Quercus robur*; 6.

*Hypholoma capnoides* (Fr.) P.Kumm. – on dead wood of coniferous tree; 6.

*Hypholoma fasciculare* (Huds.) P.Kumm. – on dead wood of deciduous tree; 2, 6.

*Hypholoma sublateralium* (Fr.) Qué. – on dead wood of deciduous tree; 6.

*Hypochnicium sphaerosporum* (Höhn. & Litsch.) J. Erikss. – on fallen trunk of *Betula* sp.; 6.

*Hypsizygus ulmarius* (Bull.) Redhead – on trunk of deciduous tree; 2.

*Chalciporus piperatus* (Bull.) Bataille – on soil, under conifers and deciduous trees; 2, 6.

*Chlorophyllum rachodes* (Vittad.) Vellinga (= *Macrolepiota rachodes* (Vitt.) Sing.) – on soil, under deciduous trees; 6.

*Chondrostereum purpureum* (Pers.) Pouzar – on dead wood of deciduous trees; 6.

*Chroogomphus rutilus* (Schaeff.) O.K.Miller – on soil, under *Pinus sylvestris*; 6.

*Infundibulicybe geotropa* (Bull.) Harmaja (= *Clitocybe geotropa* (Bull.) Qué.) – on soil, under deciduous trees; 1, 6.

*Infundibulicybe gibba* (Pers.) Harmaja (= *Clitocybe gibba* (Pers.) P.Kumm.) – on soil, under deciduous trees; 6.

*Inocybe calospora* Qué. – on soil, under deciduous trees; 6.

*Inocybe geophylla* (Fr.) P.Kumm. – on soil, under deciduous and coniferous trees; 6.

*Inocybe rimosa* (Bull.) P.Kumm. – on soil, under deciduous trees; 6.

*Inonotus dryophilus* (Berk.) Murrill – on trunk of living *Quercus robur*; 4.

*Inonotus obliquus* (Ach. ex Pers.) Pilát – on trunk of living *Betula* sp.; 6.

*Inonotus radiatus* (Sowerby) P.Karst. – on fallen trunk of *Alnus glutinosa*; 2, 6.

*Kavinia himantia* (Schwein.) J.Erikss. – on bark of *Ulmus glabra* trunk; 1.

*Kuehneromyces mutabilis* (Schaeff.) Sing. – on dead wood of deciduous trees; 1, 2, 3, 6.

*Laccaria laccata* (Scop.) Cooke – on soil, under conifers and deciduous trees; 6.

*Lacrymaria lacrymabunda* (Bull.) Pat. (= *Psathyrella velutina* (Pers.) Singer) – on soil, under deciduous trees; 1.

*Lactarius camphoratus* (Bull.) Fr. – on soil, under deciduous and coniferous trees; 6.

*Lactarius evosmus* Kühner & Romagn. – on soil; 1.

*Lactarius helvus* (Fr.) Fr. – among *Sphagnum*; 6.

*Lactarius lignyotus* Fr. – on soil, under *Picea abies*; 2.

*Lactarius lilacinus* (Lasch) Fr. – on soil, under *Alnus*; 2.

*Lactarius mitissimus* (Fr.) Fr. – on soil; 6.

*Lactarius necator* (Bull.) Pers. – on soil, under *Picea abies*, *Betula* sp.; 6.

*Lactarius obscuratus* (Lasch.) Fr. – on soil, under *Alnus*; 1, 2.

*Lactarius quietus* (Fr.) Fr. – on soil, under deciduous trees; 1.

*Lactarius rufus* (Scop.) Fr. – on soil, under deciduous and coniferous trees; 2, 6.

*Lactarius torminosus* (Schaeff.) Pers. – on soil, under *Betula* sp.; 6.

*Lactarius vietus* (Fr.) Fr. – on soil, under *Betula* sp.; 6.

*Lactarius volemus* (Fr.) Fr. – on soil, under deciduous and coniferous trees; 1.

*Laetiporus sulphureus* (Bull.: Fr.) Murrill – on trunk of living *Quercus robur*; 6, 2, 4, 5.

*Langermannia gigantea* (Batsch) Rostk. – on soil, under deciduous trees; 3.

*Leccinum scabrum* (Bull.) Gray – on soil, under *Betula*; 1, 6.

*Leccinum variicolor* Watling – on soil, under *Betula*; 1, 2.

- Leccinum versipelle* (Fr. & Hök) Snell – on soil, under *Betula*; 6.
- Lentaria byssiseda* Corner – on bark of *Acer platanoides*, *Quercus robur* trunks; 1, 2, 6.
- Lentinellus cochleatus* (Pers.) P.Karst. – on dead wood of deciduous trees; 6.
- Lepiota cristata* (Bolton) P.Kumm. – on soil, under deciduous and coniferous trees; 6.
- Lepista glaucocana* (Bres.) Singer – on soil, under deciduous trees; 2.
- Lepista nuda* (Bull.) Cooke – on soil, under deciduous and coniferous trees; 6.
- Lepista sordida* (Schumach.) Singer – on soil; 1.
- Leucocortinarius bulbiger* (Alb. & Schwein.) Singer – on soil; 2.
- Leucogyrophana sororia* (Burt) Ginns – on fallen trunk of *Pinus sylvestris*; 6.
- Limacella guttata* (Pers.) Konrad & Maubl. – on soil; 3.
- Lycoperdon perlatum* Pers. – on soil; 2, 6.
- Lycoperdon pyriforme* Schaeff. – on dead wood of deciduous trees; 2, 6.
- Macrolepiota procera* (Scop.) Singer – on soil; 1, 6.
- Marasmiellus ramealis* (Bull.) Singer – on litter; 2, 6.
- Marasmius rotula* (Scop.) Fr. – on litter, under deciduous trees; 6.
- Marasmius wynneae* Berk. & Broome – on soil; 2.
- Megacollybia platyphylla* (Pers.) Kotl. & Pouzar – on dead wood of deciduous tree; 6.
- Melanoleuca melanoleuca* (Pers.) Murrill – on soil; 1.
- Mycena epipterygia* (Scop.) Gray – on litter; 6.
- Mycena galericulata* (Scop.) Gray – on stump of *Quercus robur*; 6.
- Mycena galopus* (Pers.) P.Kumm. – on litter; 6.
- Mycena haematopus* (Pers.) P.Kumm. – on dead wood of deciduous trees; 6.
- Mycena hiemalis* (Osbeck) Quél. – on dead wood of deciduous trees; 6.
- Mycena inclinata* (Fr.) Quél. – on stump of *Quercus robur*; 6.
- \**Mycena megaspora* Kauffman – among *Sphagnum*; 6.
- Mycena pelianthina* (Fr.) Quél. – on leaf litter; 2.
- Mycena polygramma* (Bull.) Gray – on dead wood of deciduous trees; 2, 6.
- Mycena pura* (Pers.) P.Kumm. – on leaf litter; 2, 6.
- Mycena rosea* Gramberg – on leaf litter; 6.
- Mycena rosella* (Fr.) P.Kumm. – on needle litter; 2.
- Mycena sanguinolenta* (Alb. & Schwein.) P. Kumm. – on litter, under coniferous trees; 6.
- Mycena stipitata* Maas Geest. & Schwöbel – on decayed coniferous wood; 6.
- Mycena vitilis* (Fr.) Quél. – on twigs and litter; 6.
- Mycena vulgaris* (Pers.) P.Kumm. – on needle litter; 6.
- Mycena zephirus* (Fr.) P.Kumm. – on litter, under coniferous trees; 6.
- Nidularia deformis* (Willd.) Sw. – on branch of *Picea abies*; 6.
- Onnia tomentosa* (Fr.) P.Karst. – on roots of *Picea abies*; 2.
- Oxyporus populinus* (Schumach.) Donk – on trunk of *Betula* sp.; 6.
- Panellus serotinus* (Pers.) Kühner – on fallen trunk of *Alnus*; 6.
- Panellus stipticus* (Bull.) P.Karst. – on dead wood of deciduous tree; 1, 2, 6.
- Paxillus involutus* (Batsch) Fr. – on soil, under deciduous and coniferous trees; 6.
- Peniophora incarnata* (Pers.) P.Karst. – on branches of *Corylus avellana*; 2, 6.
- Peniophora quercina* (Pers.) Cooke – on branches of *Quercus robur*; 2, 6.
- Perenniporia medulla-panis* (Jacq.) Donk – on snag of *Quercus robur*; 4, 6.
- Phallus impudicus* L. – on soil, under deciduous trees; 6.
- Phellinus igniarius* (L.) Quél. s. l. – on living trunks of deciduous trees; 2, 6.
- Phellinus punctatus* (P.Karst.) Pilát – on branches of *Salix* sp., *Corylus avellana*; 6.
- Phellinus robustus* (P.Karst.) Bourdot & Galzin – on living trunks of *Quercus robur*; 2, 6.
- Phellinus tremulae* (Bondartsev) Bondartsev & P.N.Borisov – on living trunks of *Populus tremula*; 6.
- Phlebia radiata* Fr. – on dead wood of deciduous tree; 1, 2, 6.
- Phlebia tremellosa* (Schrad.) Nakasone & Burds. – on dead wood of deciduous trees; 1, 2, 3, 6.
- Phlebiella sulphurea* (Pers.) Ginns & M.N.L. Lefebvre – on branch of *Picea abies*; 6.



- Phleogena faginea* (Fr.) Link – on trunks of *Alnus*, *Fraxinus excelsior*; 3, 6, 5.
- Pholiota adiposa* (Batsch) P.Kumm. (= *P. aurivella* (Batsch) P.Kumm.) – on dead wood of deciduous trees; 3, 6.
- Pholiota flammans* (Batsch) P.Kumm. – on stump of *Picea abies*; 6.
- Pholiota squarrosa* (Weigel) P.Kumm. – on dead wood of deciduous tree; 1, 6.
- Physisporinus sanguinolentus* (Alb. & Schwein.) Pilát – on stump of *Picea abies*; 6.
- Physisporinus vitreus*** (Pers.) P.Karst. – on stump of deciduous tree; 6.
- Piptoporus betulinus* (Bull.) P.Karst. – on fallen branch, trunk of *Betula* sp.; 2, 6.
- Pleurotus ostreatus* (Jacq.) P.Kumm. – on fallen trunk of *Alnus*; 6.
- Pluteus cervinus* (Schaeff.) P.Kumm. – on dead wood of deciduous trees; 3, 2, 6.
- Pluteus nanus* (Pers.) P.Kumm. – on buried wood of deciduous trees; 6.
- Pluteus salicinus* (Pers.) P.Kumm. – on fallen trunks of *Alnus*, *Betula*; 6.
- Pluteus semibulbosus* (Lasch) Quél. – on dead wood of deciduous trees; 2.
- Polyporus badius* (Pers.) Schwein. – on fallen trunk of *Betula* sp.; 6.
- Polyporus brumalis* Pers. – on dead wood of deciduous trees; 6.
- Polyporus ciliatus* Fr. – on fallen trunk of *Betula* sp.; 6.
- Polyporus melanopus* (Pers.) Fr. – on buried wood of deciduous trees; 6.
- Postia alni* Niemelä & Vampola – on dead wood of deciduous trees; 6.
- Postia caesia* (Schrad.) P.Karst. – on fallen trunks of *Picea abies*; 2, 6.
- Postia laucomallea* (Murrill) Jülich – on fallen trunk of *Pinus sylvestris*; 6.
- Postia stiptica* (Pers.) Jülich – on dead wood of coniferous trees; 2, 6.
- Psathyrella candolleana* (Fr.) Maire – on soil, under deciduous trees; 6.
- Psathyrella cernua* (Vahl) G.Hirsch – on dead wood; 1.
- Pseudocraterellus sinuosus*** (Fr.) D.A.Reid – on soil, under deciduous trees; 1, 6.
- Pseudohydnum gelatinosum* (Scop.) P.Karst. – on fallen trunk of *Picea abies*; 1, 6.
- Pycnoporellus fulgens*** (Fr.) Donk – on fallen trunk of *Picea abies*; 2.
- Ramaria eumorpha* (P.Karst.) Corner – on coniferous litter; 6.
- Ramaria stricta* (Pers.) Quél. – on fallen trunk of *Salix* sp.; 6.
- Ramariopsis subtilis* (Pers.) R.H.Petersen – on soil, among mosses; 1.
- Rhodotus palmatus*** (Bull.) Maire – on fallen trunk of *Ulmus glabra*; 3.
- Russula aeruginea* Lindblad – on soil, under deciduous and coniferous trees; 6.
- Russula cyanoxantha* (Schaeff.) Fr. – on soil, under deciduous trees; 6.
- Russula decolorans* Fr. – on soil, under *Pinus sylvestris*; 6.
- Russula delica* Fr. – on soil, under deciduous trees; 6.
- Russula fellea* (Fr.) Fr. – on soil, under deciduous trees; 6.
- Russula firmula* Jul. Schäff. – on soil; 1.
- Russula foetens* Pers. – on soil, under coniferous and deciduous trees; 2, 6.
- Russula fragilis* (Pers.) Fr. – on soil, under *Quercus robur*; 6.
- Russula heterophylla* (Fr.) Fr. – on soil, under deciduous trees; 1.
- Russula integra* (L.) Fr. – on soil; 1.
- Russula laurocerasi* Melzer – on soil, under deciduous trees; 6.
- Russula laurocerasi* var. *fragrans* (Romagn.) Kuyper & Vuure – on soil; 1.
- Russula nigricans* (Bull.) Fr. – on soil, under coniferous and deciduous trees; 6.
- Russula ochroleuca* Pers. – on soil, under coniferous and deciduous trees; 6.
- Russula pseudointegra* Arnould & Goris – on soil, under deciduous trees; 1.
- Russula queletii* Fr. – on soil, under *Picea abies*; 6.
- Russula subfoetens* W.G.Sm. – on soil, under deciduous trees; 2.
- Russula vesca* Fr. – on soil, under coniferous and deciduous trees; 1, 6.
- Russula xerampelina* (Schaeff.) Fr. – on soil, under coniferous trees; 2, 6.
- Scleroderma areolatum* Ehrenb. – on soil, under deciduous trees; 6.

- Scopuloides rimosa* (Cooke) Jülich – on dead wood of deciduous tree; 6.
- Scytinostroma portentosum* (Berk. & M.A.Curtis) Donk – on *Quercus robur* stump; 6.
- Sebacina incrustans* (Pers.) Tul. & C.Tul. – on soil and herbaceous plants; 1.
- Schizophyllum commune* Fr. – on logs of *Betula* sp.; 6.
- Skeletocutis amorpha* (Fr.) Kotl. & Pouzar – on dead wood of coniferous trees; 6.
- Skeletocutis carneogrisea* A. David – on fallen trunk of *Pinus sylvestris*; 6.
- Skeletocutis nivea* (Jungh.) Jean Keller – on dead wood of deciduous trees; 6.
- Skeletocutis odora* (Peck ex Sacc.) Ginns – on fallen trunk of *Pinus sylvestris*; 6.
- \**Skeletocutis papyracea* A.David – on fallen trunk of *Pinus sylvestris*; 6.
- Steccherinum fimbriatum* (Pers.) J.Erikss. – on branches of *Corylus avellana*; 6.
- Steccherinum robustius* (J.Erikss. & S.Lundell) J.Erikss. (*S. laeticolor* (Berk. & M.A.Curtis) Banker ss. auct.) – on fallen trunk and branches of *Acer platanoides*; 3, 5.
- Steccherinum ochraceum* (Pers.) Gray – on branches of *Corylus avellana*, *Alnus glutinosa*; 1, 2, 6.
- Stereum hirsutum* (Willd.) Gray – on dead wood of deciduous trees; 1, 2, 3, 6.
- Stereum rugosum* (Pers.) Fr. – on branch of *Corylus avellana*; 6.
- Strobilurus esculentus* (Wulfen) Singer – on cones of *Pinus sylvestris*; 6.
- Stropharia aeruginosa* (Curtis) Quél. – on soil; 2, 6.
- Stropharia albocrenulata* (Peck) Kreisel – on trunk of *Populus tremula*; 2.
- Suillus granulatus* (L.) Roussel – on soil, under *Pinus sylvestris*; 6.
- Tomentella bryophila* (Pers.) M.J.Larsen – on fallen trunk of *Betula* sp.; 6.
- Tomentella cinerascens* (P.Karst.) Höhn. & Litsch. – on branches of *Picea abies*, *Corylus avellana*; 2, 6.
- Tomentella lapida* (Pers.) Stalpers – on branch of *Pinus sylvestris*; 6.
- Tomentella punicea* (Alb. & Schwein.) J.Schröt. – on branch of deciduous trees; 2.
- Tomentella sublilacina* (Ellis & Holw.) Wakef. – on branch of *Corylus avellana*; 6.
- Trametes hirsuta* (Wulf.) Pil. – on dead wood of deciduous trees; 6.
- Trametes ochracea* (Pers.) Gilb. & Ryvarden (= *T. multicolor* (Schaeff.) Jülich) – on dead wood of deciduous trees; 6.
- Trametes versicolor* (L.) Pil. – on dead wood of deciduous trees; 6.
- Trechispora cohaerens* (Schwein.) Jülich & Stalpers – on fallen trunk of *Pinus sylvestris*; 6.
- Trechispora kavinioides* B. de Vries – on fallen trunk of *Betula* sp.; 6.
- Tremella foliacea* Pers. – on dead wood of deciduous tree; 6.
- Trichaptum abietinum* (Dicks.) Ryvarden – on fallen trunks and stumps of *Picea abies*; 2, 6.
- Tricholoma album* (Schaeff.) P.Kumm. – on soil, under *Quercus robur*; 1, 6.
- Tricholoma columbetta* (Fr.) P.Kumm. – on soil, under deciduous trees; 3.
- Tricholoma terreum* (Schaeff.) P.Kumm. (= *Tricholoma myomyces* (Pers.) J.E.Lange) – on soil, under deciduous trees; 1.
- Tricholoma saponaceum* (Fr.) P.Kumm. – on soil, under deciduous trees; 1, 6.
- Tricholomopsis decora* (Fr.) Singer – on dead wood of coniferous trees; 1.
- Tricholomopsis rutilans* (Schaeff.) Sing. – on stump of *Pinus sylvestris*; 6.
- Tulasnella violea* (Quél.) Bourdot & Galzin – on fallen trunk of *Betula* sp.; 6.
- Tylopilus felleus* (Bull.) P.Karst. – on soil, under coniferous and deciduous trees; 6.
- Typhula spathulata* (Corner) Berthier – on twigs of *Fraxinus excelsior*; 1, 3.
- Tyromyces chioneus* (Fr.) P.Karst. – on fallen trunk of *Betula* sp.; 6.
- Vesiculomyces citrinus* (Pers.) E.Hagstr. – on dead wood of coniferous and deciduous trees; 2, 6.
- Volvariella murinella* (Quél.) Courtec. – on soil among grasses; 3.
- Xerocomus badius* (Fr.) E.-J.Gilbert – on soil, under coniferous trees; 2, 6.
- Xerocomus chrysenteron* (Bull.) Quél. – on soil, under deciduous trees; 6.
- Xerocomus subtomentosus* (L.) Fr. – on soil; 6.
- Xylobolus frustulatus* (Pers.) Boidin – on dead bark of trunks and branches of living and dead *Quercus robur*; 2, 4, 7, 8.

**MYXOMYCOTA**

*Arcyria affinis* Rostaf. – on fallen trunk of deciduous tree; 1.

*Arcyria cinerea* (Bull.) Pers. – on fallen trunk of deciduous tree; 6.

*Arcyria denudata* (L.) Wettst. – on fallen trunk of deciduous tree; 6.

*Arcyria major* (G.Lister) Ing – on fallen trunk; 1.

*Arcyria obvelata* (Oeder) Onsberg – on fallen trunk; 1.

*Badhamia macrocarpa* (Ces.) Rostaf. – on fallen *Fraxinus excelsior* trunk; 3.

*Cribraria rufa* (Roth) Rostaf. – on fallen deciduous tree trunk; 1.

*Didymium clavus* (Alb. & Schwein.) Rabenh. – on mosses covering a living tree; 3.

*Enteridium lycoperdon* (Bull.) M.L.Farr. – on *Alnus* sp. snag; 6.

*Fuligo muscorum* Alb. & Schwein. – on mosses; 2.

*Fuligo septica* (L.) F.H.Wigg. – on fallen trunk and litter; 2, 6.

*Hemitrichia calyculata* (Speg.) M.L.Farr – on fallen deciduous tree trunk; 3.

*Hemitrichia clavata* (Pers.) Rostaf. – on fallen trunks; 1, 3.

*Hemitrichia imperialis* G.Lister – on fallen trunks of *Fraxinus excelsior* and *Betula* sp.; 3, 6.

*Hemitrichia serpula* (Scop.) Rostaf. ex Lister – on fallen *Fraxinus excelsior* trunk; 3.

*Licea minima* Fr. – on fallen *Betula* sp. trunk; 6.

*Licea parasitica* (Zukal) G.W.Martin – on fallen *Fraxinus excelsior* trunk; 3.

*Lycogala epidendrum* (L.) Fr. – on wood of deciduous and coniferous trees; 1, 2, 3, 6.

*Metatrichia vesparia* (Batsch) Nann.-Bremek. ex G.W.Martin & Alexop. – on fallen deciduous tree trunks; 1, 3.

*Perichaena corticalis* (Batsch) Rostaf. – on living *Fraxinus excelsior*; 2.

*Physarum album* (Bull.) Chevall. – on fallen *Fraxinus excelsior* and *Betula* sp. trunks; 2, 3, 6.

*Physarum leucopus* Link – on fallen *Fraxinus excelsior* trunk; 3.

*Stemonitis fusca* Roth – on fallen trunks of *Fraxinus excelsior* and other deciduous trees; 1, 3, 6.

*Stemonitopsis typhina* (F.H.Wigg.) Nann.-Bremek. – on fallen *Fraxinus excelsior* trunk; 3.

*Trichia botrytis* (J.F.Gmel.) Pers. – on fallen deciduous tree trunks; 1.

*Trichia contorta* (Ditmar) Rostaf. var. *contorta* – on fallen deciduous tree trunk; 6.

*Trichia contorta* (Ditmar) Rostaf. var. *karstenii* (Rostaf.) Ing – on fallen *Fraxinus excelsior* trunk; 3.

*Trichia decipiens* (Pers.) T.Macbr. – on fallen deciduous tree trunks; 2, 3.

*Trichia favoginea* (Batsch) Pers. – on fallen *Ulmus* sp. trunk; 1.

*Trichia persimilis* P.Karst. – on fallen *Betula* sp. and *Ulmus* sp. trunks; 1, 6.

*Trichia scabra* Rostaf. – on fallen deciduous tree trunks; 3.

*Trichia varia* (Pers. ex J.F.Gmel.) Pers. – on fallen trunks and twigs; 1, 3.

*Tubifera ferruginosa* (Batsch) J.F.Gmel. – on fallen deciduous tree trunks; 1, 2, 3.

**DISCUSSION**

A total of 326 species and one variety of macrofungi (35 ascomycetes, 291 basidiomycetes) and 33 species and intraspecific taxa of myxomycetes were recorded in Asveja Regional Park.

Five species, namely *Eocronartium muscicola*, *Mycena megaspora*, *Neobulgaria pura*, *Pachyella violaceonigra* and *Skeletocutis papyracea*, were found for the first time in Lithuania. *Eocronartium muscicola*, a parasitic bryophilous basidiomycete (BOEHM & McLAUGHLIN, 1988), was found in wet habitats on mosses. *Mycena megaspora* was present among *Sphagnum* sp. in Žingiai Forest. *Skeletocutis papyracea*, a rather rare or overlooked species in Europe (RYVARDEN & GILBERTSON, 1993), was recorded on a fallen *Pinus sylvestris* trunk. Two hygrophilous ascomycetes, *Neobulgaria pura* and *Pachyella violaceonigra*, inhabited very wet or waterlogged decaying wood fallen on shady banks or beds of rivulets. These new Lithuanian records of fungi were not surprising because of the gaps in knowledge about fungal distribution in particular habitats and on specific substrates.

**Rare and red-listed species**

Rather high number, 20 species, of fungi listed in the Red Data Book of Lithuania (IRŠENAITE, KASPARAVIČIUS, 2007; KUTORGA, 2007)

were observed in Asveja Regional Park. Most species grew in deciduous forests and are wood-inhabiting. Rare fungi associated with living old *Quercus robur* trees or coarse woody debris, *Fistulina hepatica*, *Hapalopilus croceus*, *Inonotus dryophilus*, *Xylobolus frustulatus*, *Grifola frondosa*, *Lentaria byssiseda* and *Perenniporia medulla-panis*, were found fruiting in several localities of the park. Dead trunks of *Ulmus glabra* fallen in the bed of Jurkiškis rivulet hosted endangered species *Rhodotus palmatus*, which usually grows on well-decayed wet wood of broad-leaved trees. Wood-inhabiting fungi need permanent supply of wood in different stages of decay. Thus, the amount and quality of dead wood in protected areas is an important factor for survival of these fungi, and can potentially be used as indicator when estimating the conservation value (LONSDALE et al., 2008). Red-listed species *Entoloma incanum* abundantly fructified in dry meadow near the Jurkiškis rivulet. *Langermania gigantea* was found on open soil of a sloping bank of the same rivulet under deciduous, mainly broad-leaved trees. Habitats in wooded valleys of the Žverna and the Jurkiškis rivulets were also suitable for fungi of the genera *Clavaria*, *Clavulina*, *Clavulinopsis*, *Geoglossum*, *Entoloma*, *Hygrocybe* and *Ramariopsis*. These fungi are considered to be associated with unfertilized or unimproved grasslands and pastures (NEWTON et al., 2003) or deciduous forests with base-rich soil (NITARE, 2000). Because of rapid decline of suitable habitats, many species of these genera are in focus of European conservation bodies (BOERTMANN, 1995), but unfortunately they are underrepresented in the Red Data Book of Lithuania due to the lack of information about their ecology and distribution and general species conservation policy.

Most of the collected myxomycete species are common species of temperate forest ecosystems. A noteworthy find was *Hemitrichia imperialis*. It is widely distributed in the world, but is rare everywhere, being represented by scattered records only. In Lithuania this species is found mostly in late autumn on deciduous decaying wood.

### **Mycologically important localities and habitats**

The results of this investigation give an indication of mycologically valuable sites in Asveja Regional

Park. Most rare and red-listed species were found in five localities of the park, namely, wooded valleys of the Žverna and the Jurkiškis rivulets as well as Blužnėnai, Šakymas and Žingiai forests. Rare fungi, e.g. *Clavaria falcata*, *C. zollingeri*, *Clavulinopsis corniculata*, *Entoloma serrulatum*, *Hygrocybe miniata*, *Hygrocybe virginea*, *Hygrophorus nemoreus*, *Ramariopsis subtilis*, associated with unimproved grasslands or growing in deciduous forests on bare soils rich in basic compounds were found in the Žverna locality. Several of these species were found together with *Clavulinopsis helvola* and *Entoloma incanum* in the Jurkiškis locality as well. Dead wood of *Ulmus glabra* and *Acer platanoides* was suitable substrate for rare and endangered wood-inhabiting fungi such as *Hericium corraloides*, *Kavinia himantia*, *Lentaria byssiseda*, *Rhodotus palmatus* and *Steccherinum robustius*. It is worth to note, that numerous fallen and rotting trees are present on moist banks and riverbeds of the Žverna and the Jurkiškis rivulets. This coarse woody debris has stable moisture content throughout the vegetation period due to regular soaking with water. Moreover, the habitats of these shady rivulets have relatively humid microclimate. This may explain the concentration of hydrophilic species there. Rarely collected species, which are primary found in natural rivulets, are *Miladina lecithina*, *Neobulgaria pura*, *Pachyella babingtonii*, *P. violaceonigra* and *Scutellinia nigrohirtula*. All these ascomycetes are adapted to wet habitats (PFISTER, 1973; BREITENBACH & KRÄNZLIN, 1984).

Blužnėnai Forest with *Alnus glutinosa*, *Picea abies* and patches of old *Quercus robur* trees yielded not only a particularly high number of rare and red-listed species inhabiting the wood of oak, but also fungi associated with coniferous trees such as *Entoloma nitidum*, *Gyromitra infula*, *Lactarius lignyotus*, *Onnia tomentosa* and *Pycnoporellus fulgens*. Such humid forests with late succession of deciduous trees and rich vegetation are valuable as hotspot sites for rare and red-listed species (GJERDE et al., 2007).

Considering the findings of red-listed fungi *Urnula craterium*, *Cortinarius violaceus*, *Funalia trogii*, *Inonotus dryophilus*, *Perenniporia medulla-panis* and *Xylobolus frustulatus* in Šakymas Forest, the site can be regarded as a key site for rare fungi associated with broad-leaved trees. A total of 239 species of macromycetes (about 70% of recorded taxa)

and 11 species of myxomycetes (33%) were found in Žingiai Forest. Five red-listed species recorded in that mycologically valuable locality were associated with *Quercus robur*. A number of woodland key habitat indicator species such as *Clavicornia pyxidata*, *Gloeoporus dichrous*, *Polyporus badius* and *Skeletocutis nivea* were observed on woody debris of deciduous trees in that forest.

Detection of so many rare fungi in the studied localities of Asveja Regional Park during a rather short-term survey suggests that they could represent the hotspots of fungal diversity, i.e. the sites with high density of rare and threatened species (REID, 1998). Undoubtedly, further inventories are needed to assess more fully the distribution and abundance of fungi and slime molds.

#### ACKNOWLEDGEMENTS

Thanks are extended to the participants of the 18<sup>th</sup> Symposium of Baltic Mycologists and Lichenologists for their contribution to the knowledge about mycobiota of Asveja Regional Park. Organization of the Symposium was financially supported by the Research Council of Lithuania (grant No. MOR-3/2011).

#### REFERENCES

- ADAMONYTĖ G., 2001: Myxomycetes of Viešvilė Strict Nature Reserve (SW Lithuania). 3. Additions to field collections. – *Botanica Lithuanica*, 7(3): 273–286.
- ADAMONYTĖ G., MOTIEJŪNAITĖ J. (eds), 2011: XVIII Symposium of the Baltic Mycologists and Lichenologists Nordic Lichen Society Meeting, Lithuania, Dubingiai, 19–23 September 2011. Programme and Abstracts. – Vilnius.
- ANDERSSON L., KRIUKELIS R., SKUJA S., 2005: Woodland Key Habitat Inventory in Lithuania. Lithuanian Forest Inventory and Management Institute, Kaunas & Regional Forestry Board of Östra Götaland. – Linköping.
- BAŠKYTĖ R., BEZARAS V., KAVALIAUSKAS P., KLIMAVIČIUS A., RAŠČIUS G., 2006: Lietuvos saugomos teritorijos [Protected areas in Lithuania]. – Kaunas.
- BOEHM E.W.A., McLAUGHLIN D.J., 1988: *Eocronarium muscicola*: a basidiomycetous moss parasite exploiting gametophyte transfer cells. – *Canadian Journal of Botany*, 66: 762–770.
- BOERTMANN D., 1995: The genus *Hygrocybe*. Fungi of Northern Europe, Vol. 1. – Greve.
- BREITENBACH J., KRÄNZLIN F., 1984: Fungi of Switzerland, 1. *Ascomycetes*. – Lucerne.
- DAHLBERG A., GENNEY D.R., HEILMANN-CLAUSEN J., 2010: Developing a comprehensive strategy for fungal conservation in Europe: current status and future needs. – *Fungal Ecology*, 3: 50–64.
- GJERDE I., SÆTERS DAL M., BLOM H.H., 2007: Complementary hotspot inventory – a method for identification of important areas for biodiversity at the forest stand level. – *Biological Conservation*, 137: 549–557.
- IRŠENAITĖ R., 2004: Diversity and conservation of macromycetes in Dusetos Forest, Sartai Regional Park. – *Botanica Lithuanica*, 10(3): 177–194.
- IRŠENAITĖ R., KASPARAVIČIUS J., 2007: Skyrius Papėd-grybūnai (*Basidiomycota*). – In: RAŠOMAVIČIUS V. (ed.), Lietuvos raudonoji knyga [Red Data Book of Lithuania]: 633–730. – Vilnius.
- KNUDSEN H., VESTERHOLT J. (eds), 2008: *Funga Nordica*: agaricoid, boletoid and cyphelloid genera. – Copenhagen.
- KUTORGA E., 2002: Discomycetes of Viešvilė Strict Nature Reserve. 1. Diversity and distribution. – *Botanica Lithuanica*, 8(1): 77–90.
- KUTORGA E., 2007: Skyrius Aukšliagrybūnai (*Ascomycota*). – In: RAŠOMAVIČIUS V. (ed.), Lietuvos raudonoji knyga [Red Data Book of Lithuania]: 618–632. – Vilnius.
- KUTORGA E., RAITVIIR A., 2003: Discomycetes of Viešvilė Strict Nature Reserve. 2. New data and emendations. – *Botanica Lithuanica*, 9(3): 265–274.
- LADO C., 2005–2012: An on-line nomenclatural information system of Eumycetozoa. <http://www.nomen.eumycetozoa.com> (consulted 2012.11).
- LONSDALE D., PAUTASSO M., HOLDENRIEDER O., 2008: Wood-decaying fungi in the forest: conservation needs and management options. – *European Journal of Forest Research*, 127: 1–22.
- NEWTON A.C., DAVY L.M., HOLDEN E., SILVERSIDE A., WATLING R., WARD S.D., 2003: Status, distribution and definition of mycologically important grasslands in Scotland. – *Biological Conservation*, 111: 11–23.

- NITARE J. (ed.), 2000: Signalarter. Indikatorer på skyddsvärd skog Flora over Kryptogamer. – Jönköping.
- PERINI C., DAHLBERG A., FRAITURE A., 2008: Conservation and mapping of macrofungi in Europe – Advancement during the last decade. – *Coolia*, 51(4): 181–195.
- PFISTER D.H., 1973: The psilopezoid fungi. IV. The genus *Pachyella* (Pezizales). – *Canadian Journal of Botany*, 51: 2009–2023.
- REID W.V., 1998: Biodiversity hotspots. – *Trends in Ecology and Evolution*, 14: 275–280.
- RYVARDEN L., GILBERTSON R.L., 1993: European Polypores, Part 2. – Oslo.
- SENN-IRLET B., HEILMANN-CLAUSEN J., GENNEY D., DAHLBERG A., 2007: Guidance for conservation of macrofungi in Europe. – Strasbourg.
- SMITH S.E., READ D.J., 2008: *Mycorrhizal Symbiosis*. – London.
- SWIFT M.J., HEAL O.W., ANDERSON J.M., 1979: *Studies in Ecology*, Vol 5. *Decomposition in Terrestrial Ecosystems*. – Oxford.
- URBONAS V., 1984: Grybų flora. – In: Čepkelių rezervatas: 78–81. – Vilnius.
- URBONAS V., 1988: Makromicety (ekologiškųjų analiz). – In: Rastitel'nyj pokrov Nacional'nogo parka Litovskoj SSR: 98–100. – Vilnius.
- URBONAS V., JARMALAVIČIENĖ L., 2001: Viešvilės valstybinio rezervato agarikoidiniai (*Agaricales* s. l.) grybai. – *Botanica Lithuanica*, 7(4): 365–367.
- URBONAS V.A., MAZELAITIS J.V., MATELIS A.A., 1985: Makromicety fitocenozov landšaftnogo zakaznika Žalieji Ežerai (Litovskaja SSR). – Lietuvos TSR Mokslų Akademijos darbai, C serija, 3: 10–25.

## ASVEJOS REGIONINIO PARKO (LIETUVA) MAKROMICETAI IR GLEIVŪNAI

**Reda IRŠĖNAITĖ, Gražina ADAMONYTĖ, Inita DANIELE, Jonas KASPARAVIČIUS, Ernestas KUTORGA, Darius STONČIUS**

### Santrauka

Straipsnyje pateikiami Asvejos regioninio parko, esančio rytinėje Lietuvos dalyje, makromicetų ir gleivūnų įvairovės ir paplitimo tyrimų duomenys. Parko teritorijoje nustatyta 326 makromicetų ir 33 gleivūnų rūšys. Penkių rūšių grybai, *Eocronartium muscicola*,

*Mycena megaspora*, *Neobulgaria pura*, *Pachyella violaceonigra* ir *Skeletocutis papyracea*, aptikti pirmą kartą Lietuvoje. Tyrimų metu užregistruota 20 į Lietuvos raudonąją knygą įrašytų grybų rūšių. Straipsnyje aptarta retų ir saugomų rūšių paplitimas ir buveinės.