

### Macrofungi from „Tinovul de la Românești” peat bog (Dornelor Depression, Romania)

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**Abstract.** „Tinovul de la Românești” is a forested peat bog, with an area of 20 ha, located in Dornelor Depression (Eastern Carpathians) within the limits of Coșna commune, Suceava County, Romania. The mycological observations carried out in the vegetal associations *Sphagno-Piceetum* and *Vaccinio-Pinetum sylvestris*, in this peat bog, have emphasized the occurrence of 50 macrofungi species. For each vegetal association, the macrofungi diversity was analyzed, and the obtained results emphasized the presence of a high number of ectomycorrhizal and lignicolous saprophytic species. The characteristic macrofungi for forested peat bogs, identified in „Tinovul de la Românești”, are represented by the ectomycorrhizal species (associated with spruce, pine and birch) and bryophilous species (associated with peat moss).

**Key Words:** macrofungi, diversity, vegetal association, peat bog.

**Rezumat.** „Tinovul de la Românești” este o mlaștină de turbă împădurită, cu suprafața de 20 ha, localizată în Depresiunea Dornelor (Carpații Orientali) pe raza comunei Coșna, județul Suceava, România. Observațiile micologice realizate în asociațiile vegetale *Sphagno-Piceetum* și *Vaccinio-Pinetum sylvestris*, din această mlaștină, au evidențiat prezența a 50 specii de macromicete. Pentru fiecare asociație vegetală în parte s-a analizat diversitatea macromicetelor, iar rezultatele obținute au evidențiat o prezență majoritară a speciilor ectomicorizante și a celor saprofite lignicole. Macromicetele caracteristice mlaștinilor de turbă împădurite, identificate în „Tinovul de la Românești”, sunt reprezentate de specii ectomicorizante (asociate molidului, pinului și mesteacănului) și briofile (asociate mușchiului de turbă).

**Cuvinte cheie:** macromicete, diversitate, asociație vegetală, mlaștină de turbă.

**Introduction.** „Tinovul de la Românești” is a forested peat bog located in Dornelor Depression (Eastern Carpathians) within the limits of Românești village (47°21'57.5" N; 25°08'14.6" E), Coșna commune (Suceava county), at an altitude between 862-882 m.

The anthropic pressure exercised on this peat bog (drains, land clearings carried out by the locals) over time, caused significant changes materialized in surface reduction (Pop 1960). Presently, according to the information published in Official Monitor no. 98/2008, this peat bog covers an area of 20 ha. The vascular flora of this peat bog consists mainly of *Pinus sylvestris* L., *Picea abies* (L.) Karst., *Betula pendula* Roth, *Betula pubescens* Ehrh., *Vaccinium oxycoccos* L., *Vaccinium vitis-idaea* L., *Vaccinium myrtillus* L., *Andromeda polifolia* L., *Eriophorum vaginatum* L., *Drosera rotundifolia* L., etc. The muscinal stratum is dominated by species of *Sphagnum*.

The dominant vegetation is represented mainly by phytocoenosis of the vegetal associations *Vaccinio-Pinetum sylvestris* Kleist 1929 (Fig. 1.) and *Sphagno-Piceetum*



Fig. 1. Phytocoenoses of the association *Vaccinio-Pinetum sylvestris*

Kuach 1954. Previous data regarding the macrofungi diversity in this peat bog are scarce, 18 species being mentioned in scientific papers published during the period 1972-2004 (Toma 1972, Tănase 2000, 2001, 2004).

Regarding the protection of this peat bog, it is worth mentioning that since 2007 the site is an integral part of the European ecological network "Natura 2000" (Official Monitor no. 98/2008).

**Material and Method.** The observations regarding macrofungi were carried out in the vegetal associations *Vaccinio-Pinetum sylvestris* and *Sphagno-Piceetum*. Periodic fungal inventories were conducted between august 2004–september 2008. In order to characterize the macrofungal diversity in the two investigated vegetal associations, plots with an area of 500 m<sup>2</sup> were used.

During each excursion, all sporocarps of macrofungi in the study area were identified and counted. After recording the information regarding the morphological and ecological aspects, the macrofungi samples were transported to the lab in order to be examined microscopically to check and confirm the species identification. During the field observations, the macrofungi were photographed in their natural habitat. To identify the macrofungi were used Bon (1988), Borgarino & Hurtado (2004), Hansen & Knudsen (1992), Jülich (1989), Roux (2006), Shibata (2004) and Tartarat (1988). The nomenclature of the macrofungi species is according to Kirk et al. (2008).

**Results and Discussion.** The mycological observations carried out in „Tinovul de la Românești" have emphasized the occurrence of 50 macrofungi species.

**A.** The macrofungal diversity in the *Vaccinio-Pinetum sylvestris* vegetal association includes 24 species (see Table 1), classified according to the ecological categories into: ectomycorrhizal fungi (12 species), saprophytic fungi on mosses (1 species), saprophytic fungi in soil (1 species), saprophytic fungi on dead trunks and branches (1 species), saproparasitic fungi on trees (3 species), saprophytic fungi in dung (2 species), saprophytic fungi on macrofungi sporocarps (2 species), saprophytic keratinophilic fungi (1 species) and parasitic fungi on mosses (1 species).

The ectomycorrhizal species belong to the genera *Amanita*, *Cortinarius*, *Lactarius*, *Leccinum*, *Paxillus*, *Russula* and *Suillus*. Out of these, genus *Russula* is best represented, by 5 species: *Russula claroflava*, *Russula decolorans* (Fig. 2. f), *Russula emetica*, *Russula griseascens* and *Russula paludosa*. During the observations, in the vegetal association edified by pine, a high abundance for the following ectomycorrhizal species was observed: *Amanita fulva* (Fig. 2. a), *Cortinarius collinitus* (Fig. 2. b), *Lactarius helvus* (Fig. 2. e), *Russula decolorans* and *Russula emetica*. Among the ectomycorrhizal species with a low abundance, it should be mentioned *Leccinum variicolor* (Fig. 2. d), very rare in the peat bogs from the mountain area of Suceava County. The ectomycorrhizal species in the vegetal association *Vaccinio-Pinetum sylvestris* are especially associated with conifers (pine, in this case) and birch, among the broad-leaved trees. Among the macrofungi with strict specificity to the tree species we identified the following: *Lactarius turpis*, *Leccinum variicolor*, *Russula claroflava* (mycorrhizal with birch) and *Suillus variegatus* (mycorrhizal with pine).

The bryophilous species, in this vegetal association, are represented by *Tephroclybe palustris* (Fig. 2. i) and *Galerina paludosa*, recorded on peat moss.

On the ligneous substratum (stubs, trunks and fallen branches) were inventoried only 4 species, especially on birch: *Armillaria mellea*, *Piptoporus betulinus*, *Stereum hirsutum* and *Trametes hirsuta*.

The characteristic macrofungi for forested peat bogs, identified in *Vaccinio-Pinetum sylvestris*, are represented by: *Lactarius helvus*, *Russula decolorans*, *Russula emetica*, *Russula griseascens*, *Russula paludosa*, *Tephroclybe palustris* and *Galerina paludosa*. Among the preferential species in this association, were found: *Amanita fulva*, *Cortinarius collinitus*, *Lactarius turpis*, *Leccinum variicolor*, *Russula claroflava* and *Suillus variegatus* (Fig. 2. g).

In the category of accidental species, it was inventoried a rare species for the mycobiota of our country, *Onygena equina*, found on partially decomposed cattle horns.

**B.** In the *Sphagno-Piceetum* vegetal association from „Tinovul de la Românești”, the macrofungi diversity is composed of 34 species (see Table 1). The ectomycorrhizal macrofungi are well represented in comparison with other ecological categories, 21 species being recorded in the genera: *Amanita*, *Boletus*, *Cortinarius*, *Hebeloma*, *Laccaria*, *Lactarius*, *Leccinum*, *Paxillus*, *Rozites*, *Russula*, *Thelephora* and *Tylopilus*. Almost 30% of the ectomycorrhizal species belong to the genus *Lactarius*, out of which four are exclusively associated with birch: *Lactarius glyciosmus*, *Lactarius theiogalus*, *Lactarius turpis* and *Lactarius vietus*. During the field observations, a higher abundance was recorded for the following ectomycorrhizal species: *Amanita fulva*, *Hebeloma longicaudum*, *Laccaria laccata*, *Lactarius helvus* and *Lactarius rufus*. The humicolous macrofungi are represented only by 2 species, out of which *Rhodocollybia maculata* var. *maculata* is more abundant in the association edified by spruce.

On the ligneous substratum in *Sphagno-Piceetum* association, 9 species of macrofungi were observed. Among these, *Tubaria confragosa* (Fig. 2. h) is very rare, being inventoried only once, with three specimens, on rotten birch branches.

The characteristic macrofungi for forested peat bogs, found in *Sphagno-Piceetum* association are represented by: *Cortinarius rubellus* (Fig. 2. c), *Lactarius helvus*, *Russula emetica* and *Russula paludosa*. In the category of preferential species, the following were found: *Amanita fulva*, *Cortinarius paleaceus*, *Hebeloma longicaudum*, *Lactarius theiogalus*, *Lactarius turpis*, *Lactarius vietus* and *Leccinum variicolor*.

Table 1

Macrofungi species found in „Tinovul de la Românești” peat bog

Species	Vegetal associations	
	<i>Vaccinio-Pinetum sylvestris</i>	<i>Sphagno-Piceetum</i>
<u>ectomycorrhizal species</u>		
<i>Amanita fulva</i> Fr.	+	+
<i>Boletus badius</i> (Fr.) Fr.		+
<i>Cortinarius collinitus</i> (Pers.) Fr.	+	
<i>Cortinarius paleaceus</i> (Weinm.) Fr.		+
<i>Cortinarius rubellus</i> Cooke		+
<i>Hebeloma longicaudum</i> (Pers.) P. Kumm.		+
<i>Laccaria laccata</i> (Scop.) Cooke		+
<i>Lactarius deterrimus</i> Gröger		+
<i>Lactarius glyciosmus</i> (Fr.) Fr.		+
<i>Lactarius helvus</i> (Fr.) Fr.	+	+
<i>Lactarius rufus</i> (Scop.) Fr.		+
<i>Lactarius theiogalus</i> (Bull.) Gray		+
<i>Lactarius turpis</i> (Weinm.) Fr.	+	+
<i>Lactarius vietus</i> (Fr.) Fr.		+
<i>Leccinum variicolor</i> Watling	+	+
<i>Paxillus involutus</i> (Batsch) Fr.	+	+
<i>Rozites caperatus</i> (Pers.) P. Karst.		+
<i>Russula claroflava</i> Grove	+	
<i>Russula decolorans</i> (Fr.) Fr.	+	
<i>Russula emetica</i> (Schaeff.) Pers.	+	+
<i>Russula griseascens</i> (Bon & Gaugué) Marti	+	
<i>Russula ochroleuca</i> (Pers.) Fr.		+
<i>Russula paludosa</i> Britzelm.	+	+
<i>Suillus variegatus</i> (Sw.) Kuntze	+	
<i>Thelephora terrestris</i> Ehrh.		+
<i>Tylopilus felleus</i> (Bull.) P. Karst.		+
<u>parasitic fungi on mosses</u>		
<i>Tephroclybe palustris</i> (Peck) Donk	+	
<u>saprophytic fungi on mosses</u>		

Species	Vegetal associations	
	<i>Vaccinio-Pinetum sylvestris</i>	<i>Sphagno-Piceetum</i>
<i>Galerina paludosa</i> (Fr.) Kühner	+	
<u>saprophytic fungi in dung</u>		
<i>Bolbitius titubans</i> (Bull.) Fr. var. <i>titubans</i>	+	
<i>Panaeolus semiovatus</i> (Sowerby) S. Lundell & Nannf.	+	
<u>saprophytic fungi on decomposing leaves</u>		
<i>Marasmius androsaceus</i> (L.) Fr.		+
<u>saprophytic fungi on macrofungi sporocarps</u>		
<i>Collybia cirrhata</i> (Schumach.) Quél.	+	+
<i>Collybia tuberosa</i> (Bull.) P. Kumm.	+	
<u>saprophytic keratinophilic fungi</u>		
<i>Onygena equina</i> (Willd.) Pers.	+	
<u>saprophytic fungi in soil</u>		
<i>Entoloma sericeum</i> (Bull.) Quél.		+
<i>Gymnopus aquosus</i> (Bull.) Antonín & Noordel.	+	
<i>Rhodocollybia maculata</i> (Alb. & Schwein.) Singer var. <i>maculata</i>		+
<u>saprophytic fungi on dead trunks and branches</u>		
<i>Calocera cornea</i> (Batsch) Fr.		+
<i>Gloeophyllum sepiarium</i> (Wulfen) P. Karst.		+
<i>Pholiota flammans</i> (Batsch) P. Kumm.		+
<i>Postia stiptica</i> (Pers.) Jülich		+
<i>Stropharia hornemannii</i> (Fr.) S. Lundell & Nannf.		+
<i>Trametes hirsuta</i> (Wulfen) Lloyd	+	
<i>Trichaptum abietinum</i> (Dicks.) Ryvarden		+
<i>Tubaria confragosa</i> (Fr.) Harmaja		+
<i>Xeromphalina campanella</i> (Batsch) Maire		+
<u>saproparasitic fungi on trees</u>		
<i>Armillaria mellea</i> (Vahl) P. Kumm.	+	
<i>Fomitopsis pinicola</i> (Sw.) P. Karst.		+
<i>Piptoporus betulinus</i> (Bull.) P. Karst.	+	
<i>Stereum hirsutum</i> (Willd.) Pers.	+	

**Conclusions.** Observations on the macrofungi in „Tinovul de la Românești” emphasized the occurrence of 50 species. Of special importance is the finding in this peat bog of rare species such as: *Cortinarius rubellus*, *Gymnopus aquosus*, *Leccinum variicolor*, *Onygena equina*, *Russula griseascens*, *Tephrocybe palustris* and *Tubaria confragosa*.

In the *Sphagno-Piceetum* vegetal association it was recorded a higher number of macrofungi species in comparison with the *Vaccinio-Pinetum sylvestris* association, and this fact is due in particular to the occurrence of the mycorrhizal and lignicolous species associated with spruce. In both vegetal associations it was observed that the mycorrhizal species predominate, the genera *Lactarius* and *Russula* being well represented.

Out of the total of 50 species, only 8 were found in both vegetal associations, these being represented in particular by the ectomycorrhizal species: *Amanita fulva*, *Lactarius helvus*, *Lactarius turpis*, *Leccinum variicolor*, *Paxillus involutus*, *Russula emetica* and *Russula paludosa*.

The characteristic macrofungi for forested peat bogs identified in „Tinovul de la Românești” are represented by hygrophilous and acidophilous species: *Cortinarius rubellus*, *Lactarius helvus*, *Russula decolorans*, *Russula emetica*, *Russula griseascens*, *Russula paludosa*, *Galerina paludosa* and *Tephrocybe palustris*.





a



b



c



d



e



f



g



h



i

Fig. 2. Macrofungi in their natural habitat: a – *Amanita fulva*; b – *Cortinarius collinitus*; c – *Cortinarius rubellus*; d – *Leccinum variicolor*; e – *Lactarius helvus*; f – *Russula decolorans*; g – *Suillus variegatus*; h – *Tubaria confragosa*; i – *Tephrocybe palustris*.

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