JOURNAL OF FOREST SCIENCE, *50*, 2004 (3): 118–134

Dead wood and mycoflora in Nature Reserve Polom, Protected Landscape Area Železné hory

L. JANKOVSKÝ[1], J. BERÁNEK[1], A.VÁGNER[2]

[1]*Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry, Brno, Czech Republic*
[2]*The Moravian Museum, Department of Botany, Brno, Czech Republic*

ABSTRACT: Activity of fungi participating in the dead wood decomposition was studied in the Velký Polom Nature Reserve, Protected Landscape Area Železné hory. Two game-proof fences of an area of 0.30 ha (570 m alt.) and 0.19 ha (620 m alt.) were used as permanent sample plots. In both the plots, activities were monitored of wood-destroying fungi in 126.82 m^3 dead wood, 104.05 m^3 of which were in beech. After conversion to an area, the volume amounts to 258.82 m^3 per ha. In the whole reserve, almost 220 species of macromycetes were recorded in the course of a mycological survey. Wood-destroying fungi are the dominant component of mycoflora representing more than 50% identified taxa of in the period under study. The proportion of mycorrhizal fungi amounted to 14%. A series of macromycetes considered to be saprophytes is bound to products of wood decomposition. *Fomes fomentarius* (L.) Fr., *Fomitopsis pinicola* (Sowerby) P. Karst., *Ustulina deusta* (Fr.) Petrak, *Hypoxylon fragiforme* (Pers.) Kickx, *Ganoderma lipsiense* (Batsch) Atk. and the genus *Armillaria* were the predominant species of wood-decaying fungi. As for rare macro-fungi, it is possible to mention *Ascotremella faginea* (Peck) Seaver, *Stropharia albocrenulata* (Peck) Kreisel and *Tricholomopsis decora* (Fr.) Singer.

Keywords: dead wood; wood decomposition; mycoflora; wood-decaying fungi

Dead wood is an important part of forest ecosystems significantly differentiating the forest from other non-forest communities. Wood as a substrate enriches the environment from the viewpoint of biodiversity being together with soil the richest niche of the forest. Dead wood humification then connects it with soil involving a number of elements (particularly carbon) into cycling. It is irreplaceable in some types of forest ecosystems such as mountain forests and forest regeneration on a decomposed wood.

Activities of fungi in the process of dead wood decomposition were studied in the Velký Polom Nature Reserve, Protected Landscape Area Železné hory. The nature reserve extends on an area of 15.56 ha at an altitude of 545 m, about 1.5 km SE of Horní Bradlo. The forest stand represents a remnant of the silver fir/beech community of the virgin forest character with interspersed sycamore maple. Originally interspersed Norway spruce and on moist places also ash represent a prevailing component of the stands at present. On the other hand, silver fir has already virtually disappeared. Only standing and lying fragments of old dead trees gradually disappearing remain in the stands. The percentage of silver fir decreased from 1.1% in 1973 to 0.2% in 1995. From the viewpoint of volume, the proportion amounted to even 2.7% as against 0.6% (VRŠKA 1999). The whole area is surrounded by a spruce monoculture with individual admixtures of broadleaves. In recent decades, a group disintegration of overmature beech trees occurred there on several places of the reserve and thus it is possible to study a number of natural processes. In the area of Natural Reserve (NR) Polom, several game-proof fences have been established with plentiful natural seeding of beech and sycamore maple interplanted by silver fir in recent years.

The objective of the paper was to carry out inventory of dead wood in selected permanent experimental plots (PEP) and to record the present condition of wood decomposition and activities of wood-destroying fungi in the process.

MATERIAL AND METHODS

Establishment and surveying permanent experimental plots

Game-proof fences of an area of 0.30 ha (555 m alt.) – Polom I (PEP I) and 0.19 ha (620 m alt.) – Polom II

The authors are grateful for support from the Grant Agency of the Czech Republic with Project PG 096.

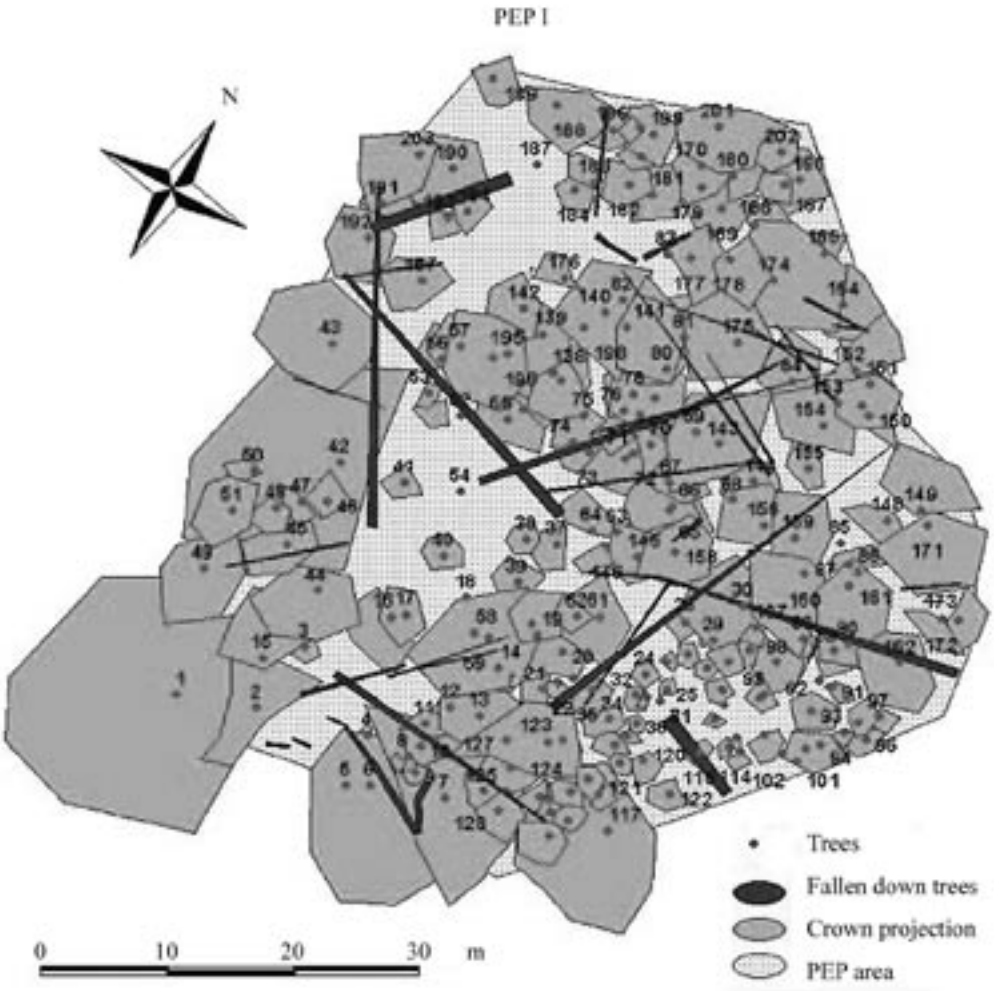

Fig. 1 Situation in plot Polom I (PEP I)

(PEP II) established in the reserve as protection against unfavourable effects of game were used as permanent experimental plots (PEP). The PEP were surveyed using the Field Map method (RUSS 2001). The present condition of the stand was recorded and documented in particular PEP and further visualized. Inventory of wood was carried out, positional surveying of particular trees in the stand (position, crown cover and profiles, height and dbh) and surveying of dead wood.

Mycofloristic survey

In the whole area of the reserve, mycofloristic survey was carried out. Both wood-destroying fungi and other ecological groups of fungi such as mycorrhizal fungi, saprophytic fungi etc. were studied. Investigation was carried out of the valence of fungi to the dead wood as a substrate.

Inventory of dead wood and wood-destroying fungi

In the course of 1999 to 2001, the occurrence was studied of wood-destroying fungi on dead wood in PEP. Particular dead stems were divided by colour to 2-m sections accurate to 5 cm and mensurational characteristics were determined. The volume of wood was calculated according to Smalian:

$$V = 2 \,.\, [0.5 \,.\, (g_0 + g_n)]$$

where g_0 and g_n are end circular areas of particular sections.

The decomposition degree was classified to 5 degrees of decomposition (humification). Degree 1: newly fallen trees without symptoms of decomposition and fruit bodies of wood-destroying fungi. Degree 2: newly fallen trees without marked symptoms of decomposition and with the sporadic occurrence of fruit bodies. The occurrence of mosses up to 5%. Degree 3: previously fallen trees with marked symptoms of the activity of wood-destroying fungi, rather plentiful occurrence of fruit bodies and mosses. Sporadic occurrence of seedlings. Degree 4: fallen trees with places of the total destruction of wood, considerable occurrence of fruit bodies and mosses. The occurrence of seedling can be more copious. Degree 5: due to activities of wood-destroying fungi wood breaks and losses any strength. Fruit bodies gradually disappear. Plentiful occurrence of mosses, grasses and seedlings.

Identified species of wood-destroying fungi on stems were summarized according to particular stages of decomposition into 10-cm diameter intervals. Branches

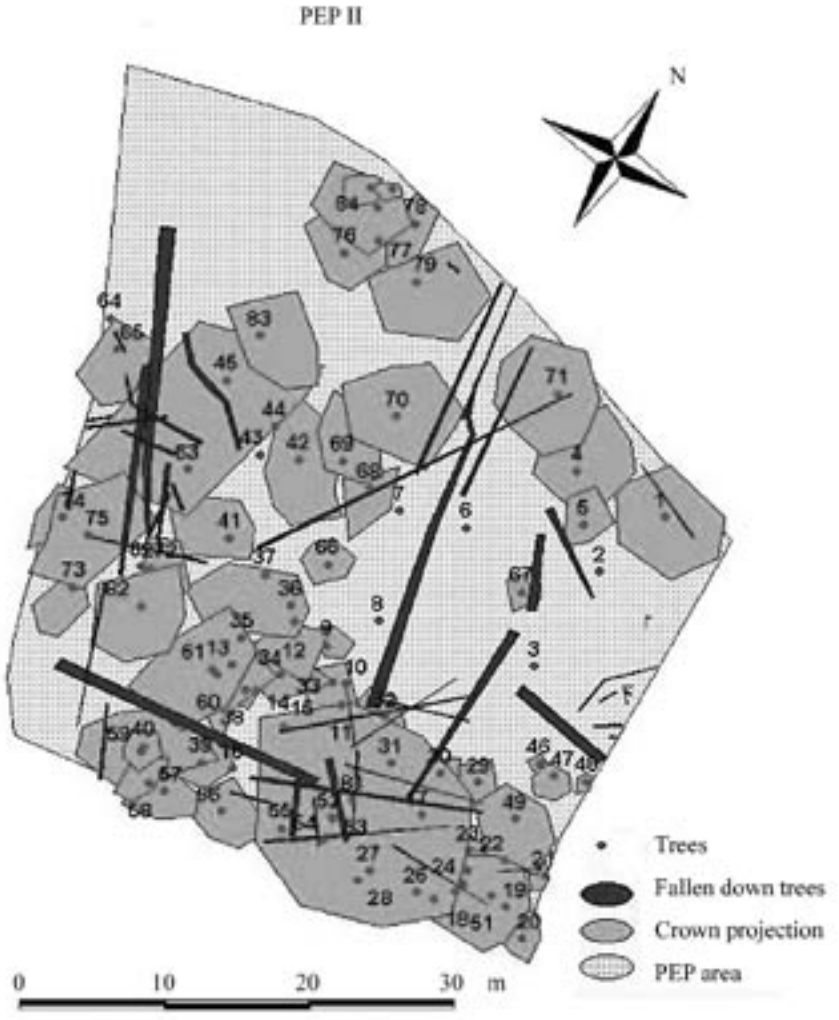

Fig. 2 Situation in plot Polom II (PEP II)

were divided only into two intervals their limit being 7 cm, i.e. timber to the top of 7 cm diameter and small-wood.

RESULTS

Mycofloristic survey

In the course of a three-year monitoring, almost 220 species of macromycetes were identified in the region of NR Polom (Table 5). More than half of observed species (viz. 112, i.e. 51%) can be considered to be wood-destroying fungi, i.e. fungi capable to decompose lignocelluloses. The number of determined mycorrhizal and saprophytic fungi was 30 (14%) and 76 (35%), respectively. A remaining percent (2 species) belonged to mycoparazitic macromycetes. The proportion of fungi bound to wood either directly as wood-destroying fungi or as saprophytes exceeds 75%. From the viewpoint of a relationship to a host, the majority of species of fungi, viz. 149 (69%) was found in beech *Fagus sylvatica* L. In spruce *Picea excelsa* (Lam.) Link, fir *Abies alba* Mill., alder *Alnus glutinosa* Gaertn. and birch *Betula pendula* Roth, ash *Fraxinus excelsior* L. and maple *Acer pseudoplatanus* L. some 85 (38%), 25 (11%), 11 (5%) and 7 species (3%), respectively were identified from the total number of detected fungi. One species was also found in *Alnus incana* Moench.

Inventory of dead wood

In both PEP under investigation, 126.82 m^3 dead wood were recorded. After conversion, the volume amounts to 258.82 m^3 per ha (Tables 1 and 2). In PEP I, 23.81 m^3 conifers and 44.22 m^3 broadleaves were recorded, in total 68.03 m^3. In PEP II, 5.91 m^3 conifers and 52.91 m^3 broadleaves, in total 58.82 m^3. The activity of wood-destroying fungi was studied in 104.05 m^3 beech wood.

Activities of wood-destroying fungi

The study of dynamics of the species spectrum of wood-destroying fungi on dead wood of beech *Fagus sylvatica* L. in relation to particular stages of decomposition was carried out in decomposition stages 2, 3 and 4. Other stages of decomposition in PEP were not noticed. As for decomposition of stems in decomposition stage 2, only 9 species were noticed (Fig. 3) *Fomes fomentarius* (L.)

Table 1. Inventory of dead wood in particular PEP

Area of NR Polom I (0.30 ha)									
Dead softwood									
Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)
a (fir)	6.94	f (spruce)	0.11	j (spruce)	0.10	n (spruce)	0.14	r (fir)	0.80
b (fir)	9.74	g (spruce)	0.06	k (spruce)	0.13	o (spruce)	0.22	s (spruce)	0.07
c (fir)	1.91	h (spruce)	0.12	l (spruce)	0.04	p (spruce)	0.11	t (spruce)	0.19
d (spruce)	0.92	i (spruce)	0.56	m (spruce)	0.05	q (spruce)	0.02	u (spruce)	0.40
e (spruce)	0.49	Total volume of conifers 23.81 m^3						v (spruce)	0.69
Dead hardwood									
Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)
A (beech)	5.14	B (beech)	9.19	C (beech)	15.16	D (beech)	8.27	E (beech)	6.46
Total volume of broadleaves 44.2 m^3									

Area of NR Polom II (0.19 ha)									
Dead softwood									
Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)
a (spruce)	1.17	d (spruce)	1.11	h (spruce)	0.07	l (spruce)	0.05	p (spruce)	0.05
b (spruce)	1.52	e (spruce)	0.36	i (spruce)	0.11	m (spruce)	0.07	q (spruce)	0.11
c (spruce)	0.18	f (spruce)	0.14	j (spruce)	0.04	n (spruce)	0.03	r (spruce)	0.02
		g (spruce)	0.82	k (spruce)	0.03	o (spruce)	0.03		
Total volume of conifers 5.91 m^3									
Dead hardwood									
Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)	Tree (species)	Stem volume (m^3)
A (beech)	13.3	B (beech)	7.59	C (beech)	8.61	D (beech)	10.74	E (beech)	12.67
Total volume of broadleaves 52.91 m^3									

a, b, c, …, r (v): fallen stems of conifers
A, B, C, …, E: fallen stems of broadleaves

Table 2. Survey of indicators of the dead wood volume per ha in studied plots

NR Polom PEP I (0.30 ha)	
Amount of dead softwood per ha	79.37 m³/ha
Amount of dead hardwood per ha	147.30 m³/ha
Amount of dead wood per ha	226.67 m³/ha
NR Polom PEP II (0.19 ha)	
Amount of dead softwood per ha	31.11 m³/ha
Amount of dead hardwood per ha	278.47 m³/ha
Amount of dead wood per ha	309.58 m³/ha

Fr. being dominant. The and *Ascocoryne sarcoides* (Jacq.) Grov. et Wilson were also very frequent, but without any importance in decayed wood mass. *Schizophyllum commune* Fr. and *Hypoxylon fragiforme* (Pers.) Kickx were dominant also in branches. The majority of species (44) was noticed in the 3rd stage of decomposition (Fig. 4). In this stage, dead wood occurs roughly in half of decomposition. There, the following species dominated: *Fomes fomentarius* (L.) Fr., *Ganoderma lipsiense* (Batsch) Atk. and a little less *Stereum* sp., *Pleurotus ostreatus* (Jacq.) P. Kumm. and *Panellus serotinus* (Pers.) Kühner and rhizomorphs of *Armillaria* sp. In branches, *Hypoxylon fragiforme* (Pers.) Kickx and *Stereum hirsutum* (Willd.) Gray dominated. In dead wood in the 4th decomposition stage (Fig. 5), 25 species were identified, *Fomes fomentarius* (L.) Fr. and *Ganoderma lipsiense* (Batsch) Atk. were absolutely predominating. In the stage of decomposition, extensive occurrence was also noticed of *Ischnoderma resinosum* (Schrad.) P. Karst., *Hypholoma sublateritium* (Fr.) Quél. and *Xylaria hypoxylon* (L.) Grev. In case of decomposition of branches, *Ganoderma lipsiense* (Batsch) Atk., *Fomes fomentarius* (L.) Fr. and *Xylaria hypoxylon* (L.) Grev. dominated.

In studying the dynamics of the species spectrum of wood-destroying fungi in relation to dimensions of decomposed wood a certain relationship was noticed between the diameter of dead wood and the number of occurring species. The number of species increased with increasing diameter to a certain limit which amounted to (in relation to decomposition stage) 60 to 100 cm when direct proportion changed to inverse proportion. In branches, the turning point was noticed in the diameter

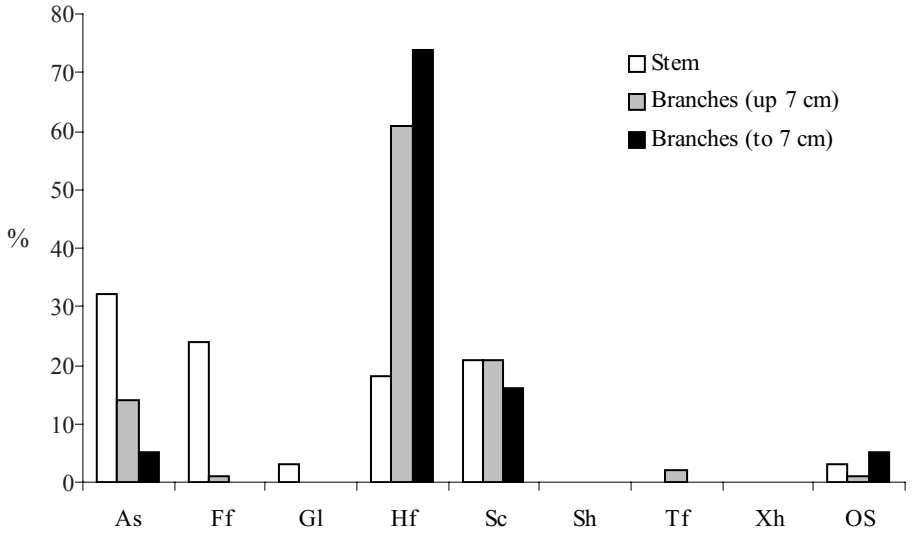

Fig. 3. Frequency of the occurrence of some species of wood-destroying fungi in dead wood in decomposition stage 2. As – *Ascocoryne sarcoides* (Jacq.) Grov. et Wilson, Ff – *Fomes fomentarius* (L.) Fr., Gl – *Ganoderma lipsiense* (Batsch) Atk., Hf – *Hypoxylon fragiforme* (Pers.) Kickx, Sc – *Schizophyllum commune* Fr., Sh – *Stereum hirsutum* (Willd.) Gray, Tf – *Tremella foliacea* (Pers.) Pers., Xh – *Xylaria hypoxylon* (L.) Grev., OS – other species (occurrence of none of the included species exceeds 10%)

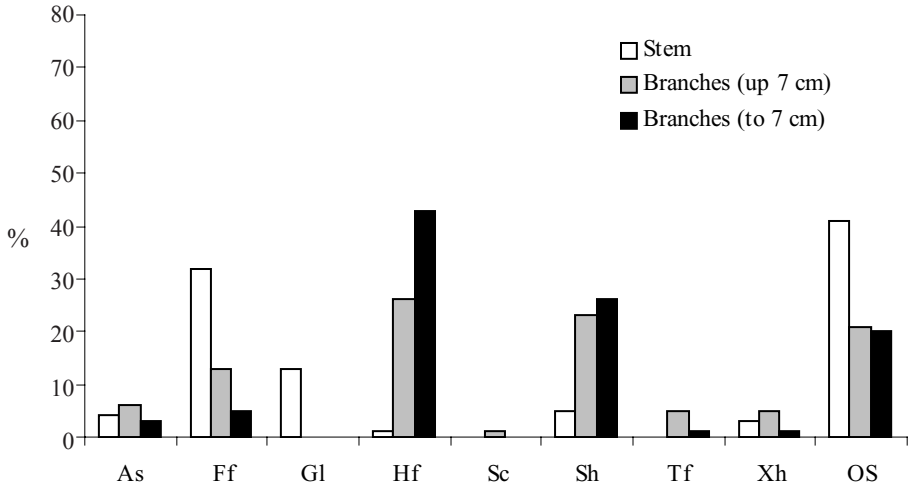

Fig. 4. Frequency of the occurrence of some species of wood-destroying fungi in dead wood in decomposition stage 3. As – *Ascocoryne sarcoides* (Jacq.) Grov. et Wilson, Ff – *Fomes fomentarius* (L.) Fr., Gl – *Ganoderma lipsiense* (Batsch) Atk., Hf – *Hypoxylon fragiforme* (Pers.) Kickx, Sc – *Schizophyllum commune* Fr., Sh – *Stereum hirsutum* (Willd.) Gray, Tf – *Tremella foliacea* (Pers.) Pers., Xh – *Xylaria hypoxylon* (L.) Grev., OS – other species

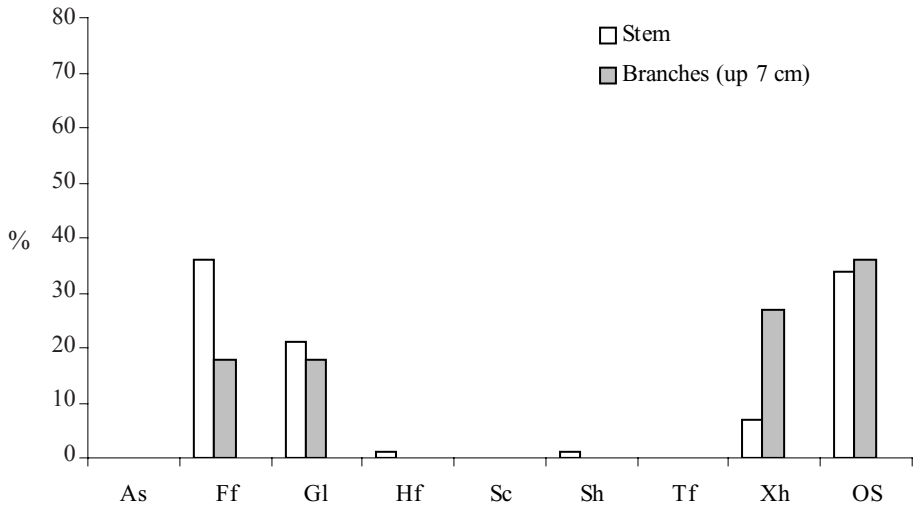

Fig. 5. Frequency of the occurrence of some species of wood-destroying fungi in dead wood in decomposition stage 4. As – *Ascocoryne sarcoides* (Jacq.) Grov. et Wilson, Ff – *Fomes fomentarius* (L.) Fr., Gl – *Ganoderma lipsiense* (Batsch) Atk., Hf – *Hypoxylon fragiforme* (Pers.) Kickx, Sc – *Schizophyllum commune* Fr., Sh – *Stereum hirsutum* (Willd.) Gray, Tf – *Tremella foliacea* (Pers.) Pers., Xh – *Xylaria hypoxylon* (L.) Grev., Os – other species

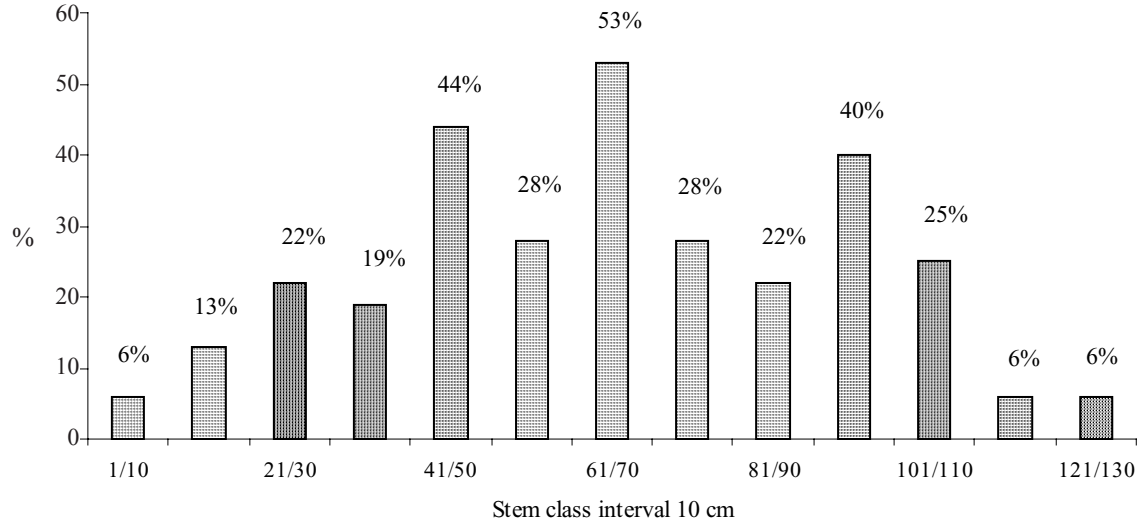

Fig. 6. Overall colonization of the beech stem by fungi species in relation to its diameter

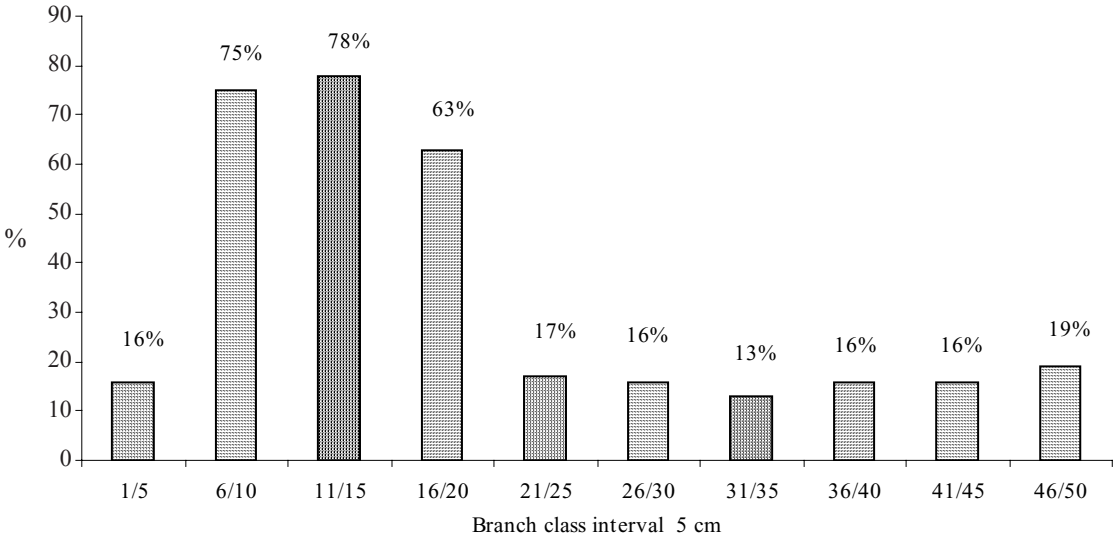

Fig. 7. Overall colonization of beech branches by fungi species in relation to their diameter

Table 3. Species spectrum of wood-destroying fungi studied in particular stages of decomposition
Bold-type face – the species did not occur in the previous stage of decomposition, thinly – the species did not occur in the next stage of decomposition, ↘ – increasing proportion of the species in decomposition of the following stage of decompositin, → – the same proportion, ↘ – decreasing proportion

Stage 2		Stage 3		Stage 4
Ascocoryne sarcoides	↘	*Ascocoryne sarcoides*	←	----------
Fomes fomentarius	↗	*Fomes fomentarius*	↗	*Fomes fomentarius*
Ganoderma lipsiense	↗	*Ganoderma lipsiense*	↗	*Ganoderma lipsiense*
Hypoxylon fragiforme	↘	*Hypoxylon fragiforme*	↘	*Hypoxylon fragiforme*
Schizophyllum commune	↗	*Schizophyllum commune*	←	----------
Tremella foliacea	↗	*Tremella foliacea*	←	----------
Athelia sp.	←	***Coniophora puteana***	↗	*Coniophora puteana*
Laxitextum bicolor	←	***Galerina marginata***	→	*Galerina marginata*
Trametes confragosa	←	***Hypholoma sublateritium***	↗	*Hypholoma sublateritium*
		Ischnoderma resinosum	↗	*Ischnoderma resinosum*
		Lycoperdon perlatum	↗	*Lycoperdon perlatum*
		Panellus serotinus	↘	*Panellus serotinus*
		Pleurotus ostreatus	↘	*Pleurotus ostreatus*
		Stereum hirsutum	↘	*Stereum hirsutum*
		Stereum rugosum	↘	*Stereum rugosum*
		Ustulina deusta	↗	*Ustulina deusta*
		Xylaria hypoxylon	↗	*Xylaria hypoxylon*
		Antrodiella hoehnelii	←	
		Armillaria borealis	←	
		Armillaria gallica	←	
		Bjerkandera adusta	←	
		Calocera cornea	←	
		Coprinus domesticus	←	
		Cylindrobasidium evolvens	←	
		Cystoderma carcharias	←	
		Dacrymyces stillatus	←	
		Datronia mollis	←	
		Diatrype disciformis	←	
		Exidia glandulosa	←	
		Inonotus nodulosus	←	
		Laxitextum bicolor	←	
		Neobulgaria pura	←	
		Oudemansiella mucida	←	
		Peziza succosa	←	
		Phanerochaete velutina	←	
		Phlebia radiata	←	
		Pholiota adiposa	←	
		Polyporus brumalis	←	
		Resinicium bicolor	←	
		Scutellinia setosa	←	
		Schizopora radula	←	
		Trametes hirsuta	←	
		Trametes versicolor	←	
		Tremella glandulosa	←	
				Corticium confluens
				Gymnopilus hybridus
				Hericium coralloides
				Lepiota castanea
				Phlebia tremellosa
				Mycena epipterygia
				Mycena galericulata
				Pluteus cervinus
				Psathyrella piluliformis
				Reticularia lycoperdon
				Rhodocollybia butyracea

interval 16–20 cm. In the diameter interval of beech stem 61 to 70 cm, as much as 17 species of fungi participated in decomposition; in the diameter interval of branches 5 to 15 cm as much as 25 species (Figs. 6 and 7). The situation corresponds to physiological requirements of wood-destroying fungi.

Fomes fomentarius (L.) Fr., *Ganoderma lipsiense* (Batsch) Atk. and *Ustulina deusta* (Fr.) Petrak participate in the decomposition of dead wood of beech, both of stems and branches attacking already living trees being the cause of decreasing the limit of physiological age of beech. Other observed species are more related to certain stages of decomposition.

Fomes fomentarius (L.) Fr., *Hypoxylon fragiforme* (Pers.) Kickx and *Ganoderma lipsiense* (Batsch) Atk. were noticed virtually in all stages of beech decomposition. *Hypoxylon fragiforme* should be considered to be a species which participates as a saprophyte in sapwood decomposition being particularly important in smallwood decomposition. Surface parts of larger dimensions of dead wood were colonized with *Hypholoma sublateritium* (Fr.) Quél., *Pleurotus ostreatus* (Jacq.) P. Kumm., *Galerina marginata* (Fr.) Kühner and *Dacrymyces stillatus* Nees: Fr. From the viewpoint of the whole decomposition process and with respect to the number of occurring species of macromycetes, stem diameter from 40 to 100 cm appears to be the most attractive part of the stem. The boundary of the occurrence of fruit bodies of the species ranged from 20 to 30 cm diameter of dead stems.

DISCUSSION

The volume of decaying wood in central European forests is estimated to range between 50 and 200 m^3 per hectare (ALBRECHT 1991). However, the volume of decaying wood greatly depends on the forest type, stand age, relief, etc. According to studies conducted in the Czech Republic from 1987 to 1991, the proportion of dead wood in present commercial forests ranges about 7% of the whole biomass (KRAUS 1999). In natural forests, the volume of dead wood is substantially greater. Studying the situation in Czech nature reserves, the share of dead trees in total stock ranges from 8 to 50% of total standing volume (HORT, VRŠKA 1999; VRŠKA et al. 2000a,b, 2001a,b,c, 2002). Expressed in absolute terms, the volume of dead wood in these reserves ranged between 50 and 220 m^3 per hectare. KORPEĽ (1988, 1997) recorded as much as 85–400 m^3 dead wood per hectare in the Carpathian spruce virgin forests. The highest biomass of dead wood was observed in the Slovak virgin forest of Badín in the disaggregation phase with 455.36 m^3/ha and with 439.16 m^3/ha in Dobroč for the same stand development stage. The relation between dead wood and living biomass in the aggregation phase (juvenile growing phase) was 1:2 in Badín forest and between 1:2 and 1:3 in the Dobroč forest, while a maximum was reached in the optimum phase with a variation between 1:5 and 1:6. In the disaggregation phase, the variation was between 1:2 and 1:2.5 (SANIGA, SCHÜTZ 2001a). Similar situation can be also noticed in other virgin forests of Slovakia (SANIGA, SCHÜTZ 2001b, 2002).

The stronger differences were revealed among the various developmental phases in the Bialowieza Primeval Forest in Poland. The volume of coarse woody debris ranged from 147 m^3/ha in degradation phase to 630 m^3/ha in biostatic-optimal phase. Difference in rate of stand development was responsible for the variability of tree volume within 338 m^3/ha in early succession stand versus 634 m^3/ha in close-to-climax stand. Coarse woody debris contributed about one-quarter of the total above ground wood biomass in Bialowieza ecosystems, ranging from 87 to 160 m^3/ha (BOBIEC 2002).

In 1995, the average standing volume of stands in NR Polom amounted to 730.46 m^3 per ha of which dead wood was 137.7 m^3 (VRŠKA et al. 1999, 2000b). It corresponds to the volume range of dead wood in central-European forests estimated by ALBRECHT (1991). On the other hand, in natural forests as much as 30% dead wood of the total standing volume are mentioned (AMMER 1991). All data concerning dead wood generally deal with wood suitable as a workable raw material, i.e. above all stems. Exact data on the volume of below-ground parts of trees are missing.

In total, decomposition was recorded and studied of 126.82 m^3 dead wood in both plots under investigation. It amounts to 258.82 m^3 per ha. Some 104.05 m^3 of which was beech wood, 18.59 m^3 silver fir wood and 11.13 m^3 spruce wood. The amount of given dead wood is comparable with volumes mentioned in other virgin forest types in the Beskids and Javorníky Mts. (HORT, VRŠKA 1999).

DEBELJAK (1999) mentions the volume of dead wood in the comparable fir/beech (*Abieti-Fagetum dinaricum*) virgin forest Pecka in Slovenia. For beech, he gives the volume of dead wood 109.29 m^3/ha and growing stock 529.65 m^3/ha and for silver fir, the volume of dead wood 521.19 m^3/ha and growing stock 166.12 m^3/ha.

JANČOVIČOVÁ (2001) gives that the greatest number of fungus species fructified on stems with partly or markedly disturbed bark and wood structure, usually covered with mosses, i.e. on stems with humification stage 3 (5-degree scale). She notes that tree species of floodplain forests provide just in these stages of decomposition, i.e. (2–) 3–4 suitable conditions for fructification of the majority of taxa of macroscopic fungi. The observations are in accordance with the situation in NR Polom where also the most numerous group of fungi were species colonizing wood in decomposition stage 3 (also 5-degree scale). It is necessary to state that the use of a decomposition stage or a humification stage can be considered to be compatible.

According to notice No. 395/1992 Gaz., *Volvariella caesiotincta* P.D. Orton and *Ascotremella faginea* (Peck) Seaver rank among seriously endangered species of fungi. As for rare species, it is necessary to mention the occurrence of *Pluteus umbrosus* (Pers.) P. Kumm., *Tricholomopsis decora* (Fr.) Singer, *Ischnoderma benzoinum* (Wahlenb.) P. Karst., *Armillaria borealis* Marxmüller et

Table 4. The survey of species of wood-destroying fungi identified in studied sections of beech stems

Diameter interval			
1–10	11–20	21–30	31–40
Fomes fomentarius	*Fomes fomentarius*	*Fomes fomentarius*	*Fomes fomentarius*
Hypoxylon fragiforme	*Hypoxylon fragiforme*	*Ganoderma lipsiense*	*Ganoderma lipsiense*
	Schizophyllum commune	*Gymnopilus hybridus*	*Hypoxylon fragiforme*
	Stereum hirsutum	*Hypoxylon fragiforme*	*Lycoperdon perlatum*
		Lycoperdon perlatum	*Psathyrella piluliformis*
		Stereum hirsutum	*Xylaria hypoxylon*
		Xylaria hypoxylon	

Diameter interval			
41–50	51–60	61–70	71–80
Ascocoryne sarcoides	*Fomes fomentarius*	*Ascocoryne sarcoides*	*Ascocoryne sarcoides*
Fomes fomentarius	*Ganoderma lipsiense*	*Coniophora puteana*	*Fomes fomentarius*
Ganoderma lipsiense	*Hypholoma sublateritium*	*Fomes fomentarius*	*Galerina marginata*
Gymnopilus hybridus	*Hypoxylon fragiforme*	*Ganoderma lipsiense*	*Ganoderma lipsiense*
Hypoxylon fragiforme	*Ischnoderma resinosum*	*Hypholoma sublateritium*	*Hypholoma sublateritium*
Ischnoderma resinosum	*Lycoperdon perlatum*	*Hypoxylon fragiforme*	*Hypoxylon fragiforme*
Lycoperdon perlatum	*Mycena epipterygia*	*Ischnoderma resinosum*	*Ischnoderma resinosum*
Pholiota adiposa	*Pholiota adiposa*	*Lepiota castanea*	*Schizophyllum commune*
Psathyrella piluliformis	*Schizophyllum commune*	*Lycoperdon perlatum*	*Stereum hirsutum*
Reticularia lycoperdon		*Merulius tremellosus*	
Schizophyllum commune		*Mycena epipterygia*	
Stereum hirsutum		*Mycena galericulata*	
Trametes versicolor		*Pleurotus ostreatus*	
Xylaria hypoxylon		*Pluteus cervinus*	
		Schizophyllum commune	
		Stereum rugosum	
		Xylaria hypoxylon	

Diameter interval			
81–90	91–100	101–110	111–120
Ascocoryne sarcoides	*Ascocoryne sarcoides*	*Armillaria gallica*	*Fomes fomentarius*
Fomes fomentarius	*Cystoderma carcharias*	*Ascocoryne sarcoides*	*Xylaria hypoxylon*
Galerina marginata	*Dacrymyces stillatus*	*Dacrymyces stillatus*	
Ganoderma lipsiense	*Fomes fomentarius*	*Fomes fomentarius*	
Hypholoma sublateritium	*Ganoderma lipsiense*	*Hericium coralloides*	
Ischnoderma resinosum	*Hericium coralloides*	*Phlebia radiata*	Diameter interval
Ustulina deusta	*Hypoxylon fragiforme*	*Pleurotus ostreatus*	121–130
	Ischnoderma resinosum	*Stereum rugosum*	*Fomes fomentarius*
	Peziza succosa		*Xylaria hypoxylon*
	Pleurotus ostreatus		
	Scutellinia setosa		
	Stereum rugosum		
	Ustulina deusta		

Table 5. An overview of identified species of fungi in NR Polom in 1999–2001 and their proportion in particular stages of decomposition

PEP – records in permanent experimental plots (I, II)

Host: Ai – *Alnus incana*, Aglut – *Alnus glutinosa,* Bet – *Betula* sp., Fag – *Fagus sylvatica*, Frax – *Fraxinus excelsior*, Bol – *Boletus* spp., Abies – *Abies alba*, Aps – *Acer pseudoplatanus*, L – broadleaved species, Pic – *Picea abies*, Piptoporus – *Piptoporus betulinus*

E – Ecological grounds: dw – saprophyte decomposing mainly dead wood, hd – saprophyte on hard decayed wood or in litter with rotten wood, s – saprophyte on the ground, m – mycorrhizal species living in symbiosis with higher plants, mp – mycoparasite on the body of other species of fungi

No.	Species	Ecology		PEP		Decomposition stage				
		Host	E	I	II	1	2	3	4	5
1	*Aleurodiscus amorphus* (Pers.: Fr.) Schroet.	Abies	s	*						
2	*Amanita battarrae* (Boud.) Bon	Fag, Pic	m							
3	*Amanita muscaria* L.	Fag, Pic	m							
4	*Amanita pantherina* (DC.) Krombh.	Pic	m							
5	*Amanita phalloides* (Fr.) Link	Fag, Pic	m							
6	*Amanita rubescens* (Pers.) Gray	Fag, Pic	m							
7	*Amanita spissa* (Fr.) P. Kumm.	Bet , Fag	m							
8	*Amylostereum areolatum* (Chaill.) Boidin	Abies	dw							
9	*Antrodia heteromorpha* (Fr.) Donk	Pic	dw							
10	*Antrodia serialis* (Fr.) Donk	Pic	dw							
11	*Antrodiella hoehnelii* (Bres.) Niemelä	Fag	dw	*				*		
12	*Antrodia sinuosa* (Fr.) P. Karst.	Pic	dw							
13	*Apiocrea chrysosperma* (Tul.) Sydow	Bol	mp							
14	*Armillaria borealis* Marxmüller & Korhonen	Fag	dw		*			*		
15	*Armillaria gallica* Marxmüller	Fag	dw	*				*		
16	*Armillaria ostoyae* (Romagn.) Herink	Pic, Abies	dw							
17	*Ascocoryne sarcoides* (Jacq.) Grov. & Wilson	Fag	dw	*	*		*	*		
18	*Ascotremella faginea* (Peck) Seaver	Fag	dw							
19	*Athelia* sp.	Fag	s		*		*			
20	*Bisporella citrina* (Batsch) Korf & Carpenter	Fag	dw							
21	*Bjerkandera adusta* (Willd.) P. Karst.	Fag, Aps	dw	*				*		
22	*Boletus badius* (Fr.) Fr.	Fag, Pic	m							
23	*Boletus edulis* L.	Fag, Pic	m							
24	*Boletus chrysenteron* Bull.	Fag	m							
25	*Boletus porosporus* (Imler) Watling	Fag, Pic	m							
26	*Boletus pruinatus* Fr. & Hök	Bet	m							
27	*Bulgaria inquinans* Fr.	Fag	dw							
28	*Calocera cornea* (Batsch.) Fr.	Fag	dw	*				*		
29	*Calocera viscosa* (Pers.) Fr.	Pic	dw							
30	*Cantharellus cibarius* Fr.	Fag, Pic	m							
31	*Cantharellus pallens* Pilát	Fag	m							
32	*Ceriporiopsis gilvescens* (Bres.) Domański	Fag	dw							
33	*Climacocystis borealis* (Fr.) Kotl. et Pouzar	Pic	dw							
34	*Clitocybe clavipes* (Pers.) P. Kumm.	Fag, Pic	s							
35	*Clitocybe inversa* (Scop.) Quél.	Fag, Pic	s							
36	*Clitocybe phaeophthalma* (Pers.) Kuyper	Fag	s							
37	*Clitocybe vibecina* (Fr.) Quél.	Abies, Fag, Pic	s							
38	*Coniophora puteana* (Schum.) P. Karst.	Fag, Pic, Abies	dw		*			*	*	
39	*Coprinus alopecia* (Lasch) Fr.	Fag	s							

Table 5 to be continued

No.	Species	Ecology		PEP		Decomposition stage				
		Host	E	I	II	1	2	3	4	5
40	*Coprinus disseminatus* (Pers.) Gray	Aps	hd							
41	*Coprinus domesticus* (Bolt.: Fr.) S. F. Gray	Fag	hd	*				*		
42	*Coprinus micaceus* (Bull.) Fr.	Pic, Fag	hd							
43	*Corticium confluens* (Fr.: Fr.) Fr.	Fag	dw	*					*	
44	*Cylindrobasidium evolvens* (Fr.) Jülich	Fag	dw	*				*		
45	*Cystoderma amianthinum* (Scop.) Fayod	Pic	s							
46	*Cystoderma carcharias* (Pers.) Fayod	Fag, Pic	s		*			*		
47	*Dacrymyces stillatus* Nees: Fr.	Pic	dw	*				*		
48	*Datronia mollis* (Sommerf.) Donk	Fag	dw	*				*		
49	*Dermocybe sanguinea* (Wulfen) Wünsche	Fag, Pic	m							
50	*Diatrype disciformis* (Hoffmann ex Fr.) Fr.	Fag	s	*				*		
51	*Diatrype stigma* (Hoffm.) Fr.	Fag	dw							
52	*Diatrypella favacea* (Fr.) Sacc.	Bet	dw							
53	*Exidia glandulosa* Bull.: Fr.	Aglut	dw	*				*		
54	*Exidia pithya* Alb. & Schwein.: Fr.	Pic	dw							
55	*Flammulaster muricatus* (Fr.: Fr.) Watling	Fag	dw							
56	*Fomes fomentarius* (L.) Fr.	Fag, Aps, Bet, Frax	dw	*	*		*	*	*	
57	*Fomitopsis pinicola* (Sowerby) P. Karst.	Pic, Abies, Bet, Fag, Ai	dw	*	*					
58	*Fuligo septica* (L) Wiggers	Pic	dw							
59	*Funalia gallica* (Fr.) Bondartzsew & Singer	Frax	dw							
60	*Galerina marginata* (Fr.) Kühner	Fag	dw	*				*	*	
61	*Ganoderma carnosum* (Pat.) P. Karst.	Abies	dw							
62	*Ganoderma lipsiense* (Batsch) Atk.	Fag, Abies	dw	*	*			*	*	
63	*Gloeophyllum abietinum* (Bull.) P. Karst.	Abies	dw							
64	*Gloeophyllum sepiarium* (Wulfen) P. Karst.	Pic	dw							
65	*Gymnopilus hybridus* (Fr.) Singer	Fag, Pic	dw	*	*				*	
66	*Gymnopilus penetrans* (Fr.) Murrill	Pic	dw		*					
67	*Gymnopus hariolorum* (Bull.)Antonín, Hall. & Noord.	Fag, Pic	s							
68	*Hericium clathroides* (Pallas) Pers.	Fag	dw							
69	*Hericium coralloides* (Scop.) Gray	Abies	dw	*					*	
70	*Heterobasidion annosum* (Fr.) Bref.	Pic, Abies	dw							
71	*Hydropus marginellus* (Pers.) Singer	Pic	dw							
72	*Hygrophoropsis aurantiaca* (Wulfen.) Maire	Fag, Pic	s							
73	*Hygrophorus pustulatus* (Pers.) Fr.	Fag, Pic	m							
74	*Hymenochaete carpatica* Pilát	Aps	dw							
75	*Hyphoderma puberum* (Fr.) Wallr.	Fag	dw							
76	*Hyphoderma sambuci* (Pers.) P. Karst.	Abies	dw							
77	*Hyphodontia alutaria* (Burt.) J. Erikss.	Abies	dw							
78	*Hyphodontia nespori* (Bres.) J. Erikss. & Hjortst.	Fag	dw							
79	*Hypholoma capnoides* (Fr.) Kummer	Abies	dw	*						
80	*Hypholoma fasciculare* (Huds.: Fr.) Kummer	Fag	dw							
81	*Hypholoma marginatum* (Pers.) J. Schröt.	Fag	dw							
82	*Hypholoma sublateritium* (Fr.) Quél.	Fag	dw	*	*			*	*	
83	*Hypocrea pulvinata* Fuckel	Piptoporus	mp							
84	*Hypoxylon cohaerens* (Pers.) Fr.	Fag	dw							

Table 5 to be continued

No.	Species	Ecology		PEP		Decomposition stage				
		Host	E	I	II	1	2	3	4	5
85	*Hypoxylon fragiforme* (Pers.) Kickx	Fag	dw	*	*		*	*	*	
86	*Hypoxylon multiforme* (Fr.) Fr.	Bet	dw							
87	*Inocybe geophylla var. lilacina* (Peck) Gillet	Pic, Frax, Fag	m							
88	*Inonotus hastifer* Pouzar	Fag	dw							
89	*Inonotus nodulosus* (Fr.) P. Karst.	Fag	dw	*				*		
90	*Inonotus obliquus* (Fr.) Pilát	Fag	dw							
91	*Inonotus radiatus* (Sowerby) P. Karst.	Fag, Aglut	dw							
92	*Ischnoderma benzoinum* (Wahlenb.) P. Karst.	Pic	dw							
93	*Ischnoderma resinosum* (Schrad.) P. Karst.	Fag	dw	*	*			*	*	
94	*Laccaria affinis* (Singer) Bon	Fag, Pic	m							
95	*Laccaria amethystina* (Huds.) Cooke	Fag, Pic	m							
96	*Lactarius lignyotus* Fr.	Fag, Pic	m							
97	*Lactarius subdulcis* (Bull) Fr.	Fag, Pic	m							
98	*Lactarius tabidus* Fr.	Bet, Pic	m							
99	*Lachnellula calyciformis* (Willd.: Fr.) Dharne	Abies	dw	*						
100	*Laxitextum bicolor* (Pers.: Fr.) Lentz	Fag	dw		*		*	*		
101	*Lentinellus cochleatus* (Pers.) P. Karst.	Fag	dw							
102	*Lepiota castanea* Quél.	Fag	s		*				*	
103	*Lepista nuda* (Fr.) Cooke	Abies, Fag, Pic	s							
104	*Lycogala epidendrum* (L.) Fr.	Pic	dw							
105	*Lycoperdon echinatum* Pers.	Fag	s							
106	*Lycoperdon perlatum* Pers.	Fag, Pic	s	*	*			*	*	
107	*Lycoperdon pyriforme* Schaeff.: Pers.	Pic	dw							
108	*Marasmius alliaceus* (Jacq.) Fr.	Aps, Fag	hd							
109	*Marasmius torquescens* Quél.	Fag	s							
110	*Marasmius wettsteinii* Sacc. & Syd.	Pic	s							
111	*Megacollybia platyphylla* (Pers.) Kotl. & Pouzar	Fag, Pic	hd							
112	*Meripilus giganteus* (Pers.) P. Karst.	Fag	dw							
113	*Meruliopsis corium* (Pers.) Ginns	Fag, Frax	dw							
115	*Mollisia cinerea* (Batsch) P. Karst.	Fag	dw							
116	*Mutinus canninus* (Huds.) Fr.	Fag, Pic	hd							
117	*Mycena capillaripes* Peck	Pic	s							
118	*Mycena capillaris* (Schum.) P. Kumm.	Fag	s							
119	*Mycena crocata* (Schrad.) P. Kumm.	Fag	s							
120	*Mycena epipterygia* (Scop.: Fr.) S. F. Gray	Fag	s		*				*	
121	*Mycena galericulata* (Scop.) Gray	Fag	hd		*				*	
122	*Mycena galopus* (Pers.) P. Kumm.	Fag, Pic	s							
123	*Mycena inclinata* (Fr.) Quél.	Fag	hd							
124	*Mycena laevigata* (Lasch) Gillet	Aglut	s							
125	*Mycena maculata* P. Karst.	Fag, Pic	hd							
126	*Mycena pura* (Pers.) P. Kumm.	Fag	s							
127	*Mycena sanguinolenta* (Alb. & Schwein.) P. Kumm.	Aglut, Pic, Fag	s							
128	*Mycena stipata* Maas G. & Schwöbel	Pic	s							
129	*Mycena viridimarginata* P. Karst.	Pic, Abies	hd							
130	*Mycena vitilis* (Fr.) Quél.	Pic, Fag	hd							
131	*Mycena vulgaris* (Pers.) P. Kumm.	Pic	s							

Table 5 to be continued

No.	Species	Ecology		PEP		Decomposition stage				
		Host	E	I	II	1	2	3	4	5
132	*Mycena zephirus* (Fr.) P. Kumm.	Fag, Pic	s							
133	*Myxarium grilletii* (Boud.) Reid	Fag	s	*				*		
134	*Naucoria melinoides* (Bull.) Kühner	Aglut	s							
135	*Nectria cinnabarina* (Tode) Fr.	Fag, Aps	dw							
136	*Nectria galligena* Bres.	Fag	dw							
137	*Neobulgaria pura* (Fr.) Petrak	Fag	dw	*				*		
138	*Oligoporus caesius* (Schrad.) Gilbn. & Ryvarden	Pic, Aglut	dw							
139	*Oligoporus ptychogaster* (C.A.Ludwig.) R. & O. Falck	Pic	dw							
140	*Oligoporus stipticus* (Pers.) Gilbn. & Ryvarden	Pic	dw							
141	*Oligoporus subcaesius* (A. David) Ryvarden & Gilb.	Fag	dw							
142	*Onnia circinata* (Fr.) P. Karst.	Pic	dw							
143	*Orbilia* sp.	Fag	hd	*					*	
144	*Otidea leporina* (Batsch) Fuckel	Fag, Pic	s							
145	*Oudemansiella mucida* (Schrad.) Höhn.	Fag	dw	*				*		
147	*Panellus serotinus* (Pers.) Kühner	Fag	dw		*			*	*	
148	*Peniophora limitata* (Chaillet) Cooke	Frax	dw							
149	*Peziza arvernensis* Boud.	Fag	s							
150	*Peziza micropus* Pers.	Fag	dw							
151	*Peziza succosa* Berkeley	Fag	s	*				*		
152	*Phallus impudicus* L.: Pers.	Fag, Pic	s							
153	*Phanerochaete tuberculata* (P. Karst.) Parm.	Abies	hd	*						
154	*Phanerochaete velutina* (DC.) P. Karst.	Fag	dw	*				*		
155	*Phlebia radiata* Fr.	Fag	dw	*				*		
156	*Phlebia tremellosa* Schrad.: Fr.	Fag	dw	*					*	
157	*Pholiota adiposa* (Batsch) P. Kumm.	Fag, Pic, Abies	dw		*			*		
158	*Pholiota flammans* (Batsch) P. Kumm.	Abies	dw							
159	*Pholiota squarrosa* (Pers.) P. Kumm.	Fag	dw							
160	*Piptoporus betulinus* (Bull.) P. Karst.	Bet	dw							
161	*Pleurotus ostreatus* (Jacq.) P. Kumm.	Aglut,Fag,Aps,Pic	dw	*	*			*	*	
162	*Pleurotus pulmonarius* (Fr.) Quél.	Fag	dw							
163	*Pluteus atromarginatus* (Singer) Kühner	Pic	hd							
164	*Pluteus cervinus* (Schaeff.) P. Kumm.	Fag, Bet	hd	*	*				*	
165	*Pluteus nanus* (Pers.) P. Kumm.	Fag	hd							
166	*Pluteus salicinus* (Pers.) P. Kumm.	Aglut	hd							
167	*Pluteus semibulbosus* (Lasch) Fr.	Fag	hd							
168	*Pluteus umbrosus* (Pers.) P. Kumm.	Fag	hd							
169	*Polyporus badius* (Pers.) Schwein.	Frax	dw							
170	*Polyporus brumalis* (Pers.) Fr.	Fag	dw	*				*		
171	*Polyporus ciliatus* Fr.	Fag	dw							
172	*Porphyrellus porphyrosporus* (Fr.) J.-E. Gilbert	Abies, Fag, Pic	m							
173	*Psathyrella fusca* (Schum.) A. Pearson	Fag	hd							
174	*Psathyrella piluliformis* (Bull.: Fr.) P. D. Orton	Fag	hd		*				*	
175	*Pseudoclitocybe cyathiformis* (Bull.: Fr.) Singer	Fag	s							
176	*Resinicium bicolor* (Alb. & Schw.: Fr.) Parm.	Fag	hd	*				*		
177	*Reticularia lycoperdon* Bull.	Fag	hd	*					*	
178	*Rhodocollybia butyracea f. asema* (Fr.) Antonín, H.&N.	Fag, Pic	s	*	*				*	

Table 5 to be continued

No.	Species	Ecology		PEP		Decomposition stage				
		Host	E	I	II	1	2	3	4	5
179	*Rhodocollybia maculata* (Alb. & Schwein.) Singer	Fag, Pic	s							
180	*Rickenella fibula* (Bull.) Raithelh.	Pic	s							
181	*Russula badia* Quél.	Bet , Pic	m							
182	*Russula emetica* (Schaeff.) Pers.	Fag, Pic	m							
183	*Russula fellea* Fr.	Fag	m							
184	*Russula nigricans* (Bull.) Fr.	Fag, Pic	m							
185	*Russula ochroleuca* Pers.	Fag, Pic, Abies	m							
186	*Russula rosea* Pers.	Fag, Pic	m							
187	*Russula violeipes* Quél.	Fag, Pic	m	*						
188	*Scutellinia scutellata* (L.) Lamb.	Brd	hd							
189	*Scutellinia erinaceus* (Schw.) O. Kuntze	Fag	hd	*				*		
190	*Serpula himantioides* (Fr.) P. Karst.	Abies, Pic	dw							
191	*Setulipes androsaceus* (L.) Antonín	Pic	s							
192	*Schizophyllum commune* Fr.	Pic, Fag	dw	*	*		*	*		
193	*Schizopora radula* (Pers.) Hallenberg	Fag	dw	*				*		
194	*Schizozopora flavipora* (Cooke) Ryvarden	Fag	dw							
195	*Stereum hirsutum* (Willd.) Gray	Fag	dw	*	*			*	*	
196	*Stereum rugosum* (Pers.) Fr.	Fag, Aglut	dw	*				*	*	
197	*Stereum sanguinolentum* (Alb. & Schwein.) Fr.	Pic	dw	*	*					
198	*Stropharia aeruginosa* (Curtis) Quél.	Fag	hd							
199	*Stropharia albocrenulata* (Peck) Kreisel	Pic	hd							
200	*Trametes confragosa* (Bolton) Joerstad	Aglut, Fag	dw		*		*			
201	*Trametes gibbosa* (Pers.) Fr.	Fag	dw							
202	*Trametes hirsuta* (Fr.) Pilát	Fag	dw	*				*		
204	*Trametes versicolor* (L.) Pilát	Fag	dw	*				*		
205	*Tremella foliacea* (Pers.) Pers.	Fag	hd	*	*		*	*		
206	*Trichaptum abietinum* (Dicks.) Ryvarden	Pic, Abies	dw	*	*					
207	*Trichaptum fuscoviolaceum* (Ehrenb.) Ryvarden	Pic	dw							
208	*Tricholomopsis decora* (Fr.) Singer	Abies	dw							
209	*Tricholomopsis rutilans* (Schaeff.) Singer	Pic	dw							
210	*Tylopilus felleus* (Bull.) P. Karst.	Fag, Pic	m							
211	*Ustulina deusta* (Fr.) Petrak	Fag	dw	*	*			*	*	
212	*Volvariella caesiotincta* P. D. Orton	Fag	dw							
213	*Volvariella bombycina* (Schaeff.: Fr.) Sing.	Fag	dw							
214	*Xerula radicata* (Relhan) Dörfelt	Fag	dw							
215	*Xylaria digitata* (L.) Grev.	Fag	dw							
216	*Xylaria hypoxylon* (L.) Grev.	Fag	dw	*	*			*	*	
217	*Xylaria longipes* Nitschke	Aglut	dw							
218	*Xylaria polymorpha* (Pers.) Grev.	Fag	dw							

Korhonen and *Stropharia albocrenulata* (Peck) Kreisel. The finds of rare species such as *Bondarzewia mesenterica* (Schaeff.) Kreisl, *Cantharellus friesii* Quel. or *Jahnoporus hirtus* (Quélet ex Cooke) Nuss mentioned by SLAVÍČEK (1999) were not confirmed.

CONCLUSION

A fir/beech stand in the studied NR Polom occurs at the beginning of the stage of disintegration when it is possible to notice decomposition of living stems of beech in con-

sequence of infection by wood-destroying fungi. *Fomes fomentarius, Ustulina deusta* and *Ganoderma lipsiense* significantly participate in parasitizing living stems of beech. Wood-destroying fungi colonizing surface parts of decaying stems and smallwood of beech are a species-rich group of fungi. Silver fir disappeared from the stand in the course of the 60s to the 90s of the last century. At present, robust dead stems occur in the reserve and only several older silver fir trees survive there. Younger age classes are missing completely.

From the total number of macromycetes observed in the area of NR Polom in 1999–2001, more than half (51%) can be considered to be wood-destroying species. Saprophytic and mycorrhizal species amounted to 35 and 14%, respectively. Most species of wood-destroying fungi (68%) were found in beech *Fagus sylvatica* L.

It is possible to state that as compared with conifers the species spectrum of wood-destroying fungi decomposing wood in broadleaves is significantly more abundant. While about 2 to 5 species participate in the primary infection of wood of one spruce stem, there are several tens of species on the stem of a fallen beech. From the viewpoint of biodiversity, mainly bulky fallen trees of larger dimensions are important.

References

ALBRECHT L., 1991. Die Bedeutung des toten Holzes im Wald. Forstwiss. Cbl., *110* (2): 106–113.

AMMER U., 1991. Konsequenzen aus den Ergebnissen der Totholzforschung für die forstliche Praxis. Forstwiss. Cbl., *110* (2): 149–157.

BOBIEC A., 2002. Living stands and dead wood in the Bialowieza forest: suggestions for restoration management. For. Ecol. Mgmt, *165*: 125–140.

DEBELJAK M., 1999. Mrtvo drevje v pragozdu Pecka. Zbor. Gozdarstva i Lesarstva, Ljubljana, *59*: 5–31.

HORT L., VRŠKA T., 1999. Podíl odumřelého dřeva v pralesovitých rezervacích ČR. In: VRŠKA T. (ed.), Význam a funkce odumřelého dřeva v lesních porostech. Sbor. ref. NP Podyjí, Vranov nad Dyjí: 75–86.

JANČOVIČOVÁ S., 2001. Sukcesné rady húb na drevinách lužných lesov (Podunajská nížina, Slovensko). In: JANKOVSKÝ L., ČERMÁK P., Tlející dřevo 2001. Sbor. ref. Brno, MZLU: 87–93.

KORPEĽ Š., 1988. Pralesy Slovenska. Bratislava, Veda: 465.

KORPEĽ Š., 1997. Totholz in Naturwaldern und Konsequenzen für Naturschutz und Forstwirtschaft. Forst u. Holz, *52* (21): 619–624.

KRAUS L., 1999. Šetření objemu nezpracovaného dřeva v lesích na území ČR. In: VRŠKA T. (ed.), Význam a funkce odumřelého dřeva v lesních porostech. Sbor. ref. NP Podyjí, Vranov nad Dyjí: 69–75.

RUSS R., 2001. Technologie Field-Map pro inventarizace lesních porostů ve vybraných zvláště chráněných územích včetně zachycení jejich dvou a trojrozměrné struktury. In: JANKOVSKÝ L., ČERMÁK P. (eds.), Tlející dřevo 2001. Sbor. ref. Brno, MZLU: 71–78.

SANIGA M., SCHÜTZ J., 2001a. Dynamik des Totholzes in zwei gemischten Urwaldern der Westkarpaten im pflanzengeographischen Bereich der Tannen-Buchen- und der Buchenwalder in verschiedenen Entwicklungsstadien. Schweiz. Z. Forstwes., *152* (10): 407–416.

SANIGA M., SCHÜTZ J.P., 2001b. Dynamics of changes in dead wood share in selected beech virgin forests in Slovakia within their development cycle. J. For. Sci., *47*: 557–565.

SANIGA M., SCHÜTZ J.P., 2002. Relation of dead wood course within the development cycle of selected virgin forests in Slovakia. J. For. Sci., *48*: 513–528.

SLAVÍČEK J., 1999. Přehled vyšších hub (*Eumycota*) v přírodní rezervaci Polom. In: Prales Polom. Sbor. prací č. 8. Železné hory, CHKO: 44–47.

VRŠKA T. et al., 1999. Vývoj pralesa Polom v období 1973–1995. In: Prales Polom. Sbor. prací č. 8. Železné hory, CHKO: 5–28.

VRŠKA T. et al., 2002. Dynamika vývoje pralesovitých rezervací v České republice. Svazek 1, Českomoravská vrchovina – Polom, Žákova hora. Praha, Academia: 213.

VRŠKA T., HORT L., ODEHNALOVÁ P., ADAM D., HORAL D., 1999. Žákova hora virgin forest after 21 years (1974–1995). J. For. Sci., *45*: 392–419.

VRŠKA T., HORT L., ODEHNALOVÁ P., ADAM D., HORAL D., 2000a. Mionší virgin forest – historical development and present situation. J. For. Sci., *46*: 411–424.

VRŠKA T., HORT L., ODEHNALOVÁ P., ADAM D., 2000b. Polom virgin forest after 22 years (1973–1995). J. For. Sci., *46*: 151–178.

VRŠKA T., HORT L., ODEHNALOVÁ P., ADAM D., HORAL D., 2001a. Razula virgin forest after 23 years (1972–1995). J. For. Sci., *47*: 15–38.

VRŠKA T., HORT L., ODEHNALOVÁ P., ADAM D., HORAL D., 2001b. The Milešice virgin forest after 21 years (1972–1996). J. For. Sci., *47*: 255–276.

VRŠKA T., HORT L., ODEHNALOVÁ P., HORAL D., ADAM D., 2001c. The Boubín virgin forest after 24 years (1972–1996). J. For. Sci., *47*: 439–459.

Received for publication September 4, 2003
Accepted after corrections December 15, 2003

Tlející dřevo a mykoflóra v PR Polom, CHKO Železné hory

J. BERÁNEK, L. JANKOVSKÝ, A. VÁGNER

Lesnická a dřevařská fakulta, Mendelova zemědělská a lesnická univerzita, Brno, Česká republika

ABSTRAKT: Aktivita hub na rozkladu tlejícího dřeva byla sledována v přírodní rezervaci Velký Polom v CHKO Železné hory. Jako trvalé zkusné plochy byly využity dvě oplocenky o ploše 0,30 ha (570 m n. m.) a ploše 0,19 ha (620 m n. m.). Na obou sledovaných plochách byla sledována aktivita dřevních hub na 126,82 m^3 tlejícího dřeva, z toho byl podíl 104,05 m^3 dřeva buku. V přepočtu na plochu činí tento objem 258,82 m^3 na ha. V celé rezervaci bylo v průběhu mykologického průzkumu zaznamenáno téměř 220 druhů makromycet. Dominantní složku mykoflóry tvoří houby dřevní, které za sledované období tvořily přes 50 % zjištěných taxonů makromycet. Podíl hub mykorhitických činil 14 %. Řada makromycet, která je považována za saprofyty, je vázána na produkty rozkladu dřevní hmoty. Převládajícími druhy dřevních hub byly *Fomes fomentarius* (L.) Fr., *Fomitopsis pinicola* (Sowerby) P. Karst., *Ustulina deusta* (Fr.) Petrak, *Hypoxylon fragiforme* (Pers.) Kickx, *Ganoderma lipsiense* (Batsch) Atk. a rod *Armillaria* spp. Ze vzácných druhů je možné zmínit *Ascotremella faginea* (Peck) Seaver, *Stropharia albocrenulata* (Peck) Kreisel a *Tricholomopsis decora* (Fr.) Singer.

Klíčová slova: odumřelá dřevní hmota; rozklad dřeva; mykoflóra; dřevní houby

V přírodní rezervaci Velký Polom v CHKO Železné hory byla sledována aktivita hub na rozkladu tlejícího dřeva. Přírodní rezervace se rozprostírá na ploše 15,56 ha v nadmořské výšce v rozpětí 545–625 m asi 1,5 km jihovýchodně od obce Horní Bradlo. V posledních desetiletích se na několika místech rezervace projevil skupinovitý rozpad přestárlých buků, a tak je zde možné sledovat celou řadu přirozených procesů. Na území PR Polom je vybudováno několik oplocenek s bohatým náletem buku a klenu doplňovaným v posledních letech výsadbou jedle.

Cílem práce bylo provést na vybraných trvalých výzkumných plochách inventarizaci odumřelé dřevní hmoty a zachytit současný stav dekompozice dřeva a aktivitu dřevních hub na tomto procesu.

V průběhu tříletého sledování bylo na území PR Polom determinováno téměř 220 druhů makromycet (tab. 5). Více než polovinu zjištěných druhů – 112 (51 %) je možné označit jako houby dřevní, tj. houby schopné rozkládat lignocelulózy. Mykorhizních druhů bylo determinováno 30 (14 %), saprofytických 76 (35 %). Zbylé procento (2 druhy) pak náleželo makromycetám mykoparazitickým. Podíl hub vázaných ať už přímo jako dřevní houby nebo na dřevo vázané saprofyty převyšuje 75 %. Z hlediska vazby na hostitele bylo na území rezervace nejvíce druhů hub – 149 (69 %) zjištěno na buku *Fagus sylvatica* L. Na smrku *Picea abies* (L.) Karst. bylo zjištěno 85 druhů (38 %) z celkového množství zjištěných druhů hub, na jedli *Abies alba* Mill. 25 druhů (11 %), na olši *Alnus glutinosa* Gaertn. a bříze *Betula pendula* Roth 11 druhů (5 %), na jasanu *Fraxinus excelsior* L. a javoru *Acer pseudoplatanus* L. 7 druhů (3 %). Jeden druh byl nalezen na *Alnus incana* Moench.

Na obou sledovaných TVP bylo zaznamenáno 126,82 m^3 tlejícího dřeva, přepočteno na plochu pak tento objem činí 258,82 m^3 na ha (tab. 1 a 2). Na TVP I bylo zaznamenáno 23,81 m^3 jehličnanů a 44,22 m^3 listnáčů, celkem 68,03 m^3. Na ploše TVP II pak bylo zaznamenáno 5,91 m^3 jehličnanů a 52,91 m^3 listnáčů, celkem 58,82 m^3. Aktivita dřevních hub byla sledována na 104,05 m^3 bukového dřeva.

Sledování dynamiky druhového spektra dřevních hub na odumřelé dřevní hmotě buku – *Fagus sylvatica* L. v závislosti na jednotlivých stadiích dekompozice bylo prováděno na dekompozičních stupních 1/2, 2 a 2/3. Jiná stadia rozkladu na TVP nebyla zaznamenána. Na dekompozici kmenů ve stadiu rozkladu 1/2 bylo sledováno pouze 9 druhů (obr. 2), z nichž dominantní byly *Fomes fomentarius* (L.) Fr. a *Ascocoryne sarcoides* (Jacq.) Grov. et Wilson. *Schizophyllum commune* Fr. a *Hypoxylon fragiforme* (Pers.) Kickx byly dominantní i na větvích. Nejvíce – celkem 44 druhů – bylo zaznamenáno ve 2. stupni dekompozice (obr. 3). V této fázi se odumřelá dřevní hmota nachází přibližně v polovině rozkladu. Zde dominoval *Fomes fomentarius* (L.) Fr., dále pak *Ganoderma lipsiense* (Batsch) Atk. a již méně rody *Stereum* sp., *Pleurotus ostreatus* (Jacq.) P. Kumm. a *Panellus serotinus* (Pers.) Kühner a rhizomorfy *Armillaria* sp. Na větvích byly dominantní *Hypoxylon fragiforme* (Pers.) Kickx a *Stereum hirsutum* (Willd.) Gray. Na tlejícím dřevě ve stupni rozkladu 2/3 bylo zjištěno 25 participujících druhů, z nichž opět naprosto převládaly *Fomes fomentarius* (L.) Fr. a *Ganoderma lipsiense* (Batsch) Atk. Dále byl na tomto stupni dekompozice pozorován rozsáhlejší výskyt *Ischnoderma resinosum* (Schrad.) P. Karst., *Hypholoma sublateritium* (Fr.) Quél. a *Xylaria hypoxylon* (L.) Grev. Byly-li přítomny větve, podílely se na jejich rozkladu převážně *Ganoderma lipsiense* (Batsch) Atk., *Fomes fomentarius* (L.) Fr. a *Xylaria hypoxylon* (L.) Grev.

Jedlobukový porost ve sledované PR Polom se nachází na počátku fáze rozpadu, kdy je možné zaznamenat

rozpad živých kmenů buku v důsledku infekce dřevními houbami. Významně se na parazitaci živých kmenů buků podílejí druhy *Fomes fomentarius, Ustulina deusta* a *Ganoderma lipsiense*. Jedle z porostu vypadla v průběhu 60.–90. let. V současnosti jsou v rezervaci přítomny mohutné tlející kmeny, přežívá zde pouze několik starších jedinců jedle. Zcela scházejí mladší věkové třídy.

Corresponding author:

Dr. Ing. LIBOR JANKOVSKÝ, Mendelova zemědělská a lesnická univerzita, Lesnická a dřevařská fakulta, Lesnická 37, 613 00 Brno, Česká republika
tel. + fax: + 420 545 134 116, e-mail: jankov@mendelu.cz