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DAMAGE TO SPRUCE STANDS BY DEER BARKING AND SUBSEQUENT ROTS IN FOREST RANGE PROKLEST, THE KŘTINY TRAINING FOREST ENTERPRISE "MASARYK FOREST" (THE DRAHANY UPLAND)

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Abstract

ČERMÁK, P., JANKOVSKÝ, L., LIČKA, D., BERÁNEK, J., GLOGAR, J.: *Damage to spruce stands by deer barking and subsequent rots in Forest Range Proklest, the Křtiny Training Forest Enterprise "Masaryk Forest" (the Drahany Upland)*. Mendel. Brun., 2004, LII, No. 2, pp. 165-174

The paper deals with determination of the rate of damage by red deer barking, determination of the rate of damage by a subsequent rot caused by *Stereum sanguinolentum* and the rate of its progress. The paper elucidates causes of the damage and quantifies depreciation of wood by rots in the Proklest Forest Range, the Křtiny Training Forest Enterprise "Masaryk Forest". The deer barking caused damage to 85% of stands. In the most damaged 2nd and 4th age classes, rot caused by *Stereum sanguinolentum* was noticed in 89% of damaged trees. The greatest proportion is made by damage from the 70s of the last century. After the 80s, the damage occurred only exceptionally. The average percentage loss of wood is highest in the 2nd age class, viz. 38%. The determined progress of the rot ranged from 1 to 36.4 $cm.year^{-1}$.

deer barking, rot, *Stereum sanguinolentum*, red deer, wood depreciation

Deer barking and subsequent rots caused particularly by *Stereum sanguinolentum* (ALB. & SCHW.: FR.) FR. represent one of the most important problems in the Czech Republic. As early as 1970, forest inventory showed that browsing and subsequent rots totally damaged 70 thousand ha reduced area of spruce stands (ČERNÝ, 2001). In 1994, some 106 thousand ha and in 1999 already 220 thousand ha were found of the reduced area of damaged stands in the Czech Republic. In comparing curves of the development of the average height of barked and unbarked stands, SIMON and KOLÁŘ (2001) came to the average difference in wood prices in the stands amounting to about CZK 266 000 per ha. All-republic losses caused by deer barking, browsing and subsequent rots were estimated to several milliard CZK per year in the 80s. Financial consequences of the damage will become evident in next decades when the damaged stands reach a felling age (of course if they survive).

Deer barking and browsing are important not only from the viewpoint of losses in wood production and disturbances in the mechanical stability of stands (with an important risk of the premature disintegration of stands) but also as factors increasing predisposition to the effect of other harmful factors. The figures on damages related to losses of wood (apart from losses in yields) are warning, nevertheless, they do not express a total detriment which should necessarily include also increased risks just of the factors.

Stands in the region of the Training Forest Enterprise (TFE) were damaged by deer barking in the 60s to the 80s of the last century. With respect to the high proportion of Norway spruce, Forest Range Proklest belonged to the most affected regions of the TFE. After the intense reduction in the number of red deer at the end of the 80s and at the beginning of the 90s, deer barking has become a history and new peeling damages of larger extent do not appear. A number of stands damaged by peeling is about 60 – 80 years old and in some stands, symptoms of a premature disintegration are evident. The objective of the paper was to map the extent of damage to stands by deer barking in Forest Range Proklest (FR Proklest), to determine the time of the damage and to monitor the progress of the rot in peeled stems. On the basis of the data to evaluate the present condition of forest stands and the total effect of deer barking on the quality of the stands in last decades.

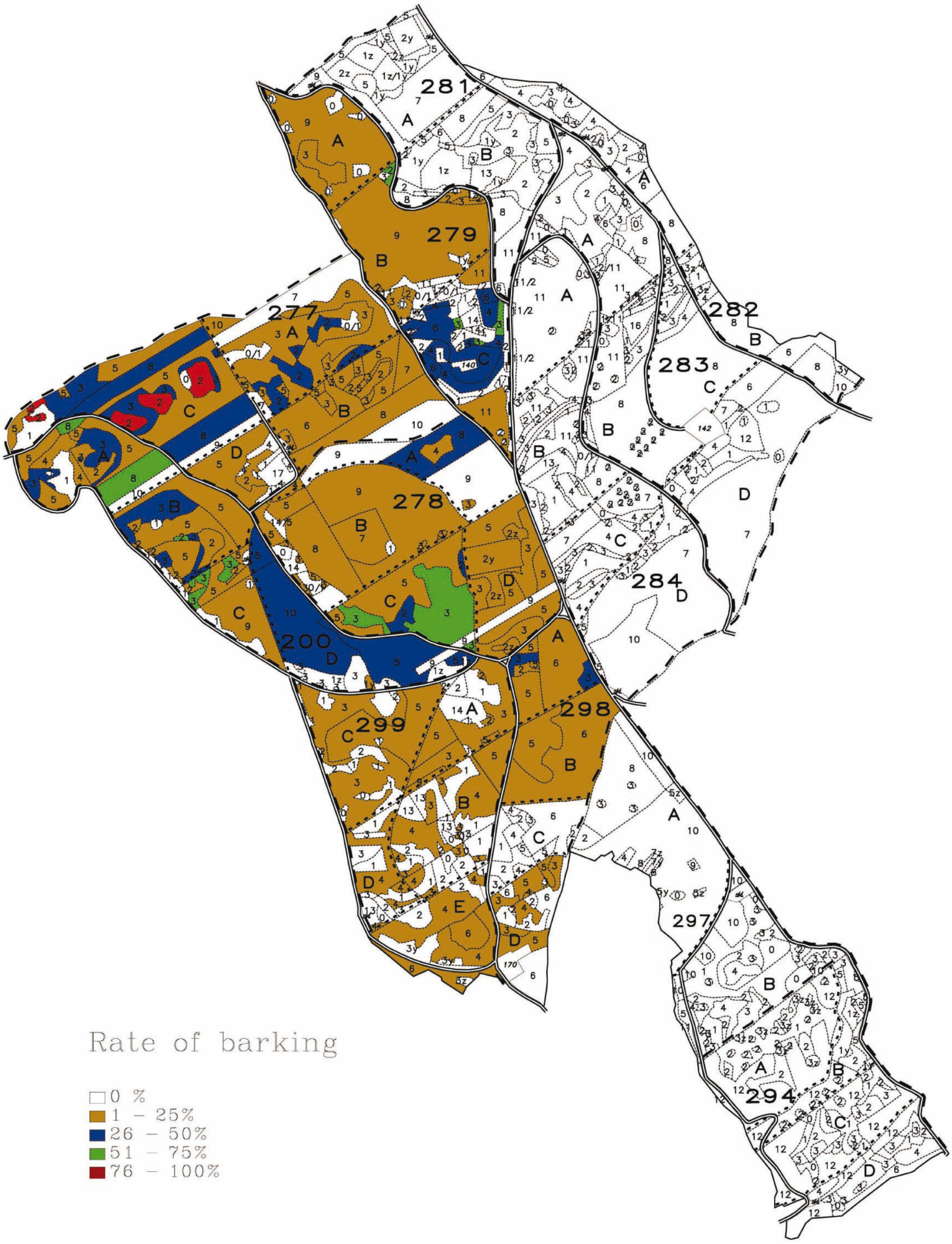
MATERIAL AND METHODS

FR Proklest, TFE Křtiny is situated 15 km NE of Brno in the region of the Drahanská vrchovina Upland geomorphological unit, on monotonous sediments of culm. The forest range is situated on an area over 420 ha north of the village of Bukovina at 490 – 574 m altitude (peak Proklest). The biota belongs to the 3rd oak/beech (south and west of the FR) and the 4th beech forest vegetation zone. Potential vegetation would be created by beech forests of *Luzula* type, in broken topography by herb-rich beech forests. Biodiversity is increased by the contact of the Drahanská vrchovina Upland with north-Pannonian and Carpathian subprovinces. The rich beech community 4B is a predominating group of forest types (64.02%). The group is completed particularly by the group of forest types 3B - rich oak/beech community (5.99 %). A predominating species is Norway spruce (*Picea* abies (L.) Karst) - 60.37% and a corresponding management group of stands 441 – spruce management of medium altitudes (almost 60%). Beech management with the total proportion of beech (*Fagus sylvatica* L.) - 17.23% amounts to only 20.7%.

A method based on the ocular classification and qualified estimate was selected for the basic determination of the extent, distribution and age of the damage to stands. An actual field survey consisted in ranking each of the stand parts (on the basis of a round) into three classification categories included in Table I. In total, 116 stand parts were assessed in this way (see Fig. 1).

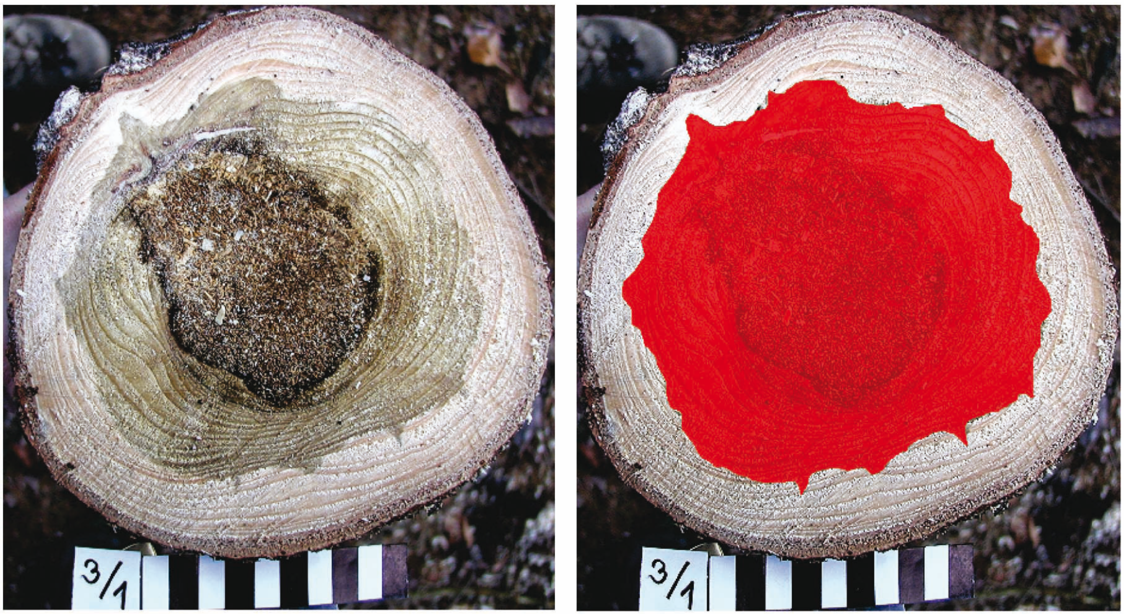
I: *An overview of the classification of deer barking*

Classification of the rate of barking		
0	0% damaged trees	undamaged stand
1	1-25% damaged trees	moderately damaged stand
2	26-50% damaged trees	medium damaged stand
3	51-75% damaged trees	heavily damaged stand
4	76-100% damaged trees	destroyed stand
Classification of the type of barking (distribution in a stand)		
A	dispersed	
B	clustered	
C	full-area	
Classification of the age of barking		
I	max. 3 years	since 2000
II	4-12 years	the 90s
III	13-22 years	the 80s
IV	23-32 years	the 70s
V	33-42 years	the 60s
VI	43-52 years	the 50s



1: *Classification of the rate of barking - Forest range Proklest*

For the detailed determination of the extent of rot and its progress in stems, 7 medium and heavily damaged stand parts were selected (2 in the 2nd age class, 3 in the 3rd and 2 in the 4th age classes). The parts were suitable for placing sample plots 50 x 50 m in the central part of the FR (according to the stand age, stand composition and rate of damage). In the sample plots, evaluation of the health condition was carried out in particular trees through grading into the following categories: sound tree, damaged tree and a damaged tree with a rot (open wounds, oozy occluded wounds, wounds of a large extent). In total, 1512 trees were evaluated. For particular stand parts and age classes the proportion of damaged trees was expressed (the percentage of damaged trees of all monitored trees) and the proportion of trees with a rot (the percentage of damaged trees with a rot of all damaged trees). In each of the plots, 5-10 sample trees were selected the trees being felled and examined in detail (in total 38 sample trees). The sample trees were measured (total length, mid-diameter) and then shortened to 1-m sections up to a height of penetration of *Stereum sanguinolentum*. In case of a rot which was imperceptible at the end of a section, the section was cut in half. The percentage loss of wood substance was determined (the proportion of the stem volume with the occurrence of a rot of the total volume of a sample tree). The time of the origin of deer barking damage was also determined. For all butts of particular sections digital images were made (with a respective scale and number of a sample tree /section). On the basis of the images, biometrical measurements were carried out in LUCIA program – rot volume, total area of the butt end (Fig. 2). From the determined parameters volumes of sections and volumes of sound wood and rot were calculated (according to the Smalian formula) in the sections.

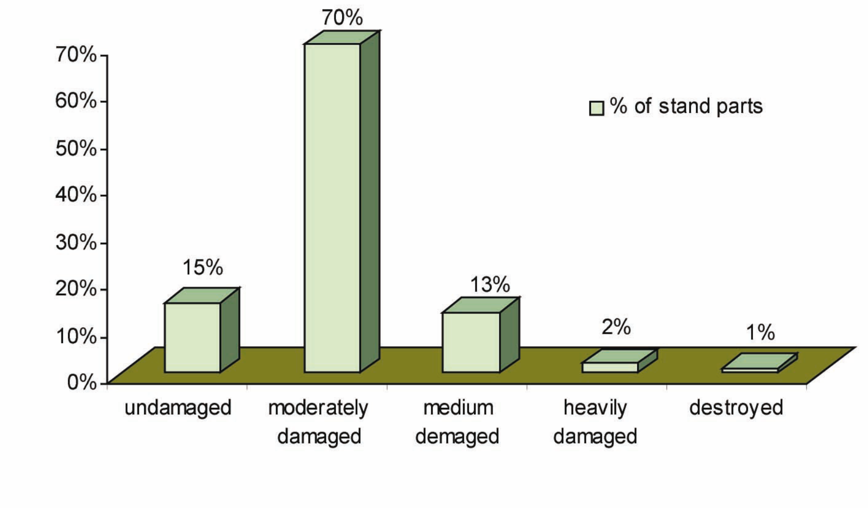


2: *An example of thresholding the rot in LUCIA program*

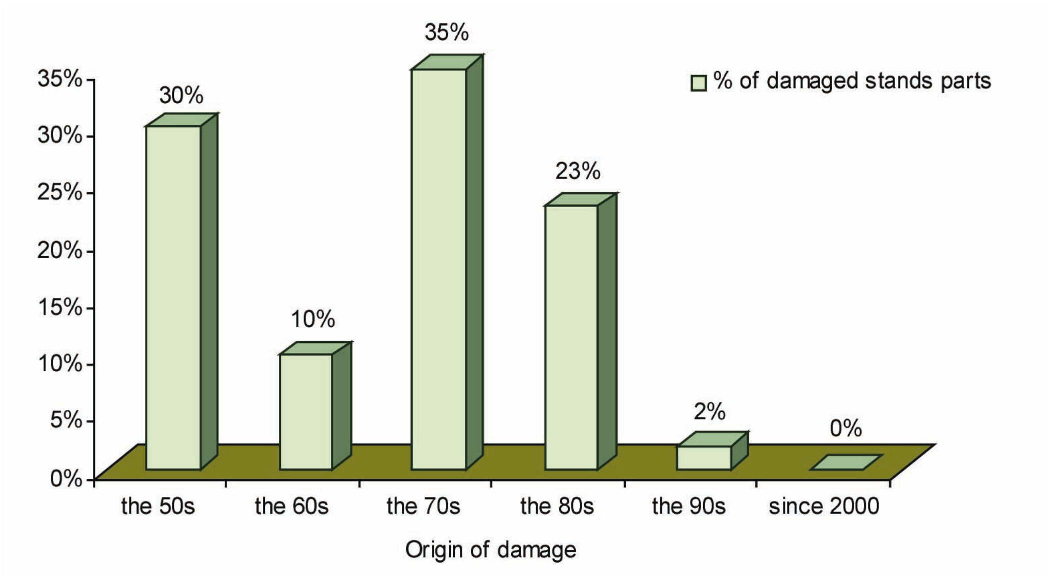
RESULTS

Based on field examinations and data obtained it is possible to state that 85% of stands of FR Proklest is damaged by deer barking (See Fig. 1.). The high rate of damage caused by the spruce stand barking is a serious factor in spite of the fact that in the majority of cases (70%) it refers to moderate damage (see Fig. 3). Greater damages were noticed only in the central part of the FR (particularly stands aged 30 – 40 years) which can be caused by a relative stillness in the stands. On the contrary, moderate damage in the southern part of the FR can be related to the existence of neighbouring fields and the nearby village of Bukovina. A completely destroyed stand was recorded only in one stand part in the northern edge of the central part – 277 C2.

In the majority of stands, the damage originated in a period when their age ranged between 15 and 30 years. The greatest proportion is made by damages from the 70s (Fig. 4). After the 80s, the damages occurred only exceptionally and damages from the 90s were noticed only in young stands below 30 years of age in the central part of FR Proklest. Damage originated after 2000 was not detected.



3: *Damage to stands according to categories of the rate of peeling classification*



4: *Dating of the origin of peeling damage to stands*

The proportion of damaged trees in particular age classes varies reaching 89% in the 2nd and 4th age classes and 68% in the 3rd age class. In total, it referred to 79% of all trees under monitoring. The proportion of trees with rots decreases from 86% in the 2nd class across 81% in the 3rd class to 72% in the 4th age class. In total, it referred to 82% of all injured trees. The average percentage loss of wood substance (proportion of the stem volume with the presence of rot of the total volume of a sample tree) is highest in the 2nd age class, viz. 38%, in the 3rd age class it amounts to 33% and in the 4th age class 26%.

The rot penetrated into sample trees through an injury at a height of about 1.3 m – 1.5 m and from there, it spread with a rate of 1 – 36.4 $cm.year^{-1}$. In trees of the 2nd age class, the rot spread with a rate of 19.1

cm.year-1 (from 2.9 to 36.4 cm.year-1), in the 3rd age class the rot spread with a rate of 12.3 cm.year-1 (from 1 to 29.2 cm.year-1) and in the 4th age class already only with a rate of 5.4 cm.year-1 (from 1.2 to 12.8 cm.year-1).The rot affected one to six 1-m sections. Thus, the most valuable part of the stem was depreciated and the rot destroyed 0 to 66.8% of the wood volume of stem sections containing the rot, on average 42.62% (Tab. II).

II: *Results of the wood volume measurement in sections*

Sample tree	Section	Volume Whole cm³	Volume Healthy cm³	Volume Rot cm³	Part of rot %
1	1/0-1	264,50	204,35	60,15	22,74%
	1/1-2	263,90	216,90	47,00	17,81%
	1/2-3	251,85	228,50	23,35	9,27%
	Total	**780,25**	**649,75**	**130,50**	**16,73%**
2	2/0-1	300,40	155,65	144,75	48,19%
	2/1-2	239,40	95,95	143,45	59,92%
	2/2-3	197,20	91,20	106,00	53,75%
	2/3-4	170,90	103,45	67,45	39,47%
	2/4-5	160,00	141,80	18,20	11,38%
	Total	**1067,90**	**588,05**	**479,85**	**44,93%**
3	3/0-1	402,85	227,60	175,25	43,50%
	3/1-2	276,25	122,55	153,70	55,64%
	3/2-3	229,10	113,50	115,60	50,46%
	3/3-4	218,25	154,70	63,55	29,12%
	3/4-5	205,55	195,65	9,90	4,82%
	Total	**1332,00**	**814,00**	**518,00**	**38,89%**
4	4/0-1	385,95	216,25	169,70	43,97%
	4/1-2	271,65	124,60	147,05	54,13%
	4/2-3	240,10	114,05	126,05	52,50%
	4/3-4	220,65	142,00	78,65	35,64%
	4/4-5	197,55	180,90	16,65	8,43%
	Total	**1315,90**	**777,80**	**538,10**	**40,89%**
5	5/0-1	279,90	115,65	164,25	58,68%
	5/1-2	178,10	108,25	69,85	39,22%
	5/2-3	140,95	131,65	9,30	6,60%
	Total	**598,95**	**355,55**	**243,40**	**40,64%**
6	6/0-1	201,90	165,05	36,85	18,25%
	6/1-2	146,15	109,30	36,85	25,21%
	Total	**348,05**	**274,35**	**73,70**	**21,18%**
7	7/0-1	181,80	59,40	122,40	67,33%
	7/1-2	144,30	46,30	98,00	67,91%
	7/2-3	115,60	72,70	42,90	37,11%
	Total	**441,70**	**178,40**	**263,30**	**59,61%**
8	8/0-1	280,00	247,75	32,25	11,52%
	8/1-2	194,10	172,85	21,25	10,95%
	Total	**474,10**	**420,60**	**53,50**	**11,28%**

Sample tree	Section	Volume Whole cm³	Volume Healthy cm³	Volume Rot cm³	Part of rot %
9	9/0-1	229,10	90,70	138,40	60,41%
	9/1-2	164,90	51,75	113,15	68,62%
	9/2-3	141,30	43,45	97,85	69,25%
	9/3-4	131,25	42,90	88,35	67,31%
	9/4-5	119,80	63,50	56,30	47,00%
	Total	**786,35**	**292,30**	**494,05**	**62,83%**
10	10/0-1	453,40	216,25	237,15	52,30%
	10/1-2	317,90	153,20	164,70	51,81%
	10/2-3	279,40	182,65	96,75	34,63%
	10/3-4	269,90	253,25	16,65	6,17%
	Total	**1320,60**	**805,35**	**515,25**	**39,02%**
11	11/0-1	104,80	52,70	52,10	49,71%
	11/1-2	84,00	37,05	46,95	55,89%
	11/2-3	72,55	50,95	21,60	29,77%
	11/3-4	66,50	59,05	7,45	11,20%
	Total	**327,85**	**199,75**	**128,10**	**39,07%**
12	12/0-0,5	96,88	85,63	11,25	11,61%
	12/0,5-1	73,53	62,28	11,25	15,30%
	Total	**170,40**	**147,90**	**22,50**	**13,20%**
13	13/0-1	354,35	166,20	188,15	53,10%
	13/1-2	259,95	105,80	154,15	59,30%
	13/2-3	203,60	94,30	109,30	53,68%
	13/3-4	185,75	121,75	64,00	34,46%
	13/4-5	172,85	154,15	18,70	10,82%
	Total	**1176,50**	**642,20**	**534,30**	**45,41%**
14	14/0-1	118,90	55,75	63,15	53,11%
	14/1-2	84,00	71,15	12,85	15,30%
	Total	**202,90**	**126,90**	**76,00**	**37,46%**
15	15/0-1	105,05	58,05	47,00	44,74%
	15/1-1,5	72,00	63,35	8,65	12,01%
	Total	**177,05**	**121,40**	**55,65**	**31,43%**
16		0,00	0,00	0,00	0,00%
	Total	**0,00**	**0,00**	**0,00**	**0,00%**
17	17/0-1	153,00	97,45	55,55	36,31%
	17/1-2	100,85	94,90	5,95	5,90%
	Total	**253,85**	**192,35**	**61,50**	**24,23%**

Sample tree	Section	Volume Whole cm³	Healthy cm³	Rot cm³	Part of rot %
18	18/0-1	125,10	103,70	21,40	17,11%
	18/1-2	96,85	74,20	22,65	23,39%
	Total	**221,95**	**177,90**	**44,05**	**19,85%**
19	19/0-1	188,25	141,70	46,55	24,73%
	19/1-1,5	128,00	31,15	96,85	75,66%
	Total	**316,25**	**172,85**	**143,40**	**45,34%**
20	20/0-1	547,85	221,25	326,60	59,61%
	20/1-2	405,05	131,10	273,95	67,63%
	20/2-3	279,15	102,50	176,65	63,28%
	20/3-4	257,70	153,80	103,90	40,32%
	20/4-5	241,60	214,45	27,15	11,24%
	Total	**1731,35**	**823,10**	**908,25**	**52,46%**
21	21/0-1	316,10	148,05	168,05	53,16%
	21/1-2	221,45	77,50	143,95	65,00%
	21/2-3	171,40	66,85	104,55	61,00%
	21/3-4	143,45	94,80	48,65	33,91%
	21/4-4,5	129,40	122,25	7,15	5,53%
	Total	**981,80**	**509,45**	**472,35**	**48,11%**
22	22/0-1	569,10	152,25	416,85	73,25%
	22/1-2	422,75	154,50	268,25	63,45%
	22/2-3	349,45	249,15	100,30	28,70%
	22/3-3,5	166,95	139,95	27,00	16,17%
	Total	**1508,25**	**695,85**	**812,40**	**53,86%**
23	23/0-1	163,70	48,30	115,40	70,49%
	23/1-2	118,10	30,50	87,60	74,17%
	23/2-3	90,05	26,40	63,65	70,68%
	23/3-4	80,75	27,85	52,90	65,51%
	23/4-5	75,75	39,80	35,95	47,46%
	23/5-6	69,65	57,20	12,45	17,88%
	Total	**598,00**	**230,05**	**367,95**	**61,53%**
24	24/0-1	220,55	55,85	164,70	74,68%
	24/1-2	172,85	34,10	138,75	80,27%
	24/2-3	124,25	38,25	86,00	69,22%
	24/3-4	105,70	42,65	63,05	59,65%
	24/4-5	97,85	68,60	29,25	29,89%
	Total	**721,20**	**239,45**	**481,75**	**66,80%**
25	25/0-1	394,95	75,85	319,10	80,80%
	25/1-2	218,55	56,50	162,05	74,15%
	25/2-3	135,30	51,30	84,00	62,08%
	25/3-4	122,05	65,25	56,80	46,54%
	25/4-5	107,55	87,40	20,15	18,74%
	Total	**978,40**	**336,30**	**642,10**	**65,63%**

Sample tree	Section	Volume Whole cm³	Healthy cm³	Rot cm³	Part of rot %
26	26/0-1	134,75	98,80	35,95	26,68%
	26/1-2	86,55	71,70	14,85	17,16%
	Total	**221,30**	**170,50**	**50,80**	**22,96%**
27	27/0-1	300,35	132,05	168,30	56,03%
	27/1-2	201,15	71,00	130,15	64,70%
	27/2-3	134,10	96,25	37,85	28,23%
	Total	**635,60**	**299,30**	**336,30**	**52,91%**
28	28/0-1	464,60	246,85	217,75	46,87%
	28/1-2	274,20	159,15	115,05	41,96%
	28/2-3	189,60	137,60	52,00	27,43%
	28/3-3,5	86,40	54,50	31,90	36,92%
	Total	**1014,80**	**598,10**	**416,70**	**41,06%**
29	29/0-1	527,35	209,30	318,05	60,31%
	29/1-2	353,90	135,30	218,60	61,77%
	29/2-3	279,25	115,15	164,10	58,76%
	29/3-4	247,80	124,75	123,05	49,66%
	29/4-5	213,80	166,10	47,70	22,31%
	29/5-5,5	100,55	96,50	4,05	4,03%
	Total	**1722,65**	**847,10**	**875,55**	**50,83%**
30	30/0-1	332,15	134,05	198,10	59,64%
	30/1-2	209,40	104,00	105,40	50,33%
	30/2-3	180,75	124,25	56,50	31,26%
	30/3-4	172,50	155,95	16,55	9,59%
	30/4-5	156,55	154,05	2,50	1,60%
	Total	**1051,35**	**672,30**	**379,05**	**36,05%**
31	31/0-1	281,50	109,00	172,50	61,28%
	31/1-2	192,80	77,15	115,65	59,98%
	31/2-3	145,35	71,05	74,30	51,12%
	31/3-4	130,50	67,50	63,00	48,28%
	31/4-5	121,15	83,50	37,65	31,08%
	31/5-6	115,50	107,60	7,90	6,84%
	Total	**986,80**	**515,80**	**471,00**	**47,73%**
32	32/0-1	758,35	210,65	547,70	72,22%
	32/1-2	522,90	133,90	389,00	74,39%
	32/2-3	397,55	127,35	270,20	67,97%
	32/3-4	350,40	192,75	157,65	44,99%
	32/4-5	313,45	278,50	34,95	11,15%
	Total	**2342,65**	**943,15**	**1399,50**	**59,74%**
33	33/0-1	429,20	314,80	114,40	26,65%
	33/1-2	270,30	220,05	50,25	18,59%
	33/2-2,5	105,50	100,60	4,90	4,64%
	Total	**805,00**	**635,45**	**169,55**	**21,06%**

Sample tree	Section	Volume Whole cm³	Volume Healthy cm³	Volume Rot cm³	Part of rot %
34	34/0-1	635,55	613,80	21,75	3,42%
	34/1-2	406,75	385,00	21,75	5,35%
	Total	**1042,30**	**998,80**	**43,50**	**4,17%**
35	35/0-1	480,50	157,50	323,00	67,22%
	35/1-2	308,40	82,70	225,70	73,18%
	35/2-3	198,10	92,95	105,15	53,08%
	35/3-4	174,35	125,05	49,30	28,28%
	35/4-4,5	78,20	61,65	16,55	21,16%
	Total	**1239,55**	**519,85**	**719,70**	**58,06%**
36	36/0-1	860,00	527,30	332,70	38,69%
	36/1-2	516,10	413,25	102,85	19,93%

Sample tree	Section	Volume Whole cm³	Volume Healthy cm³	Volume Rot cm³	Part of rot %
	Total	**1376,10**	**940,55**	**435,55**	**31,65%**
37	37/0-1	513,65	329,80	183,85	35,79%
	37/1-2	316,90	192,65	124,25	39,21%
	37/2-3	265,35	184,60	80,75	30,43%
	37/3-4	250,05	194,40	55,65	22,26%
	37/4-4,5	125,58	93,93	31,65	25,20%
	Total	**1471,53**	**995,38**	**476,15**	**32,36%**
38	38/0-1	572,65	469,60	103,05	18,00%
	38/1-2	419,60	403,60	16,00	3,81%
	Total	**992,25**	**873,20**	**119,05**	**12,00%**
Average		**861,41**	**494,24**	**367,17**	**42,62%**

DISCUSSION AND CONCLUSIONS

The stands are most often damaged at an age of 15 –30 years. At that time, lower branches begin to dry and for the present still smooth bark becomes thus an easily available food. Preferring stands at an age of about 20 years during deer barking is noted by a number of authors, e.g. ECKMÜLLNER (1985) or ZÁRUBA et al. (1966).

The proportion of damaged trees reached on average 79% in the sample plots, a similar proportion, viz. 75% was stated by FRANZ et al. (1991) in damaged stands of the 1st - 3rd age classes in Bavaria, 80% damaged trees were found by EIDMANN (1952) in Germany and 50-90% gives SZUKIEL (1986) for Poland. The total proportion of trees damaged by deer barking in sample plots fluctuates in particular age classes. A fall which could be expected (with respect to the gradual removing damaged trees from stands within tending felling) does not occur being also detected in the course of similar studies (PEKA, 1996; ŠTEFEK, 1986). The situation is explained by data on dating the damage. The low damage in the 3rd age class is obviously caused by the lower rate of damage in the 60s. The decreasing trend in the proportion of trees with a rot is caused particularly by sanitary fellings aimed primarily at the most damaged trees (with open dried-up wounds of a large extent or oozy occlusions). A decrease in the proportion of trees with a rot with the increasing age is given by ŠTEFEK (1986) and PEKA (1996).

A rot caused by *Stereum sanguinolentum* was noticed in 82% trees damaged by deer barking. PECHMANN et al. (1971) detected occurrence of the rot in 60% trees with a stem injury, 59% stems were attacked in the Mořkov Forest District (the Beskids Protected Landscape Area) in 2002 (ČERMÁK et al., 2003), ROEDER (1971) gives 99.7% attacked trees from northern Germany. Progress of the rot in a range of 1-36.4 cm.year^{-1} is lower than that given by ČERNÝ (1989), viz. 30-80 cm.year^{-1}.

With respect to the fact that deer barking damages have markedly decreased after the reduction of deer populations it is possible to suppose that high game stocks were the main cause of damages. A positive relationship between the rate of deer barking damages and the number of red deer was found by TRISL et al. (1999) in Germany, SZUKIEL (1978) mentions positive correlation between barking damages and red deer density in various regions of Poland, high game stocks were also the main cause of damages in Forest District Mořkov in the Beskids (ČERMÁK et al., 2003).

Damage to stands caused by deer barking is an important economic problem. In a number of stands, spruce round timber is completely depreciated. A survey carried out by SIMON and KOLÁŘ in the Hrubý Jeseník Mts. demonstrated that it can refer to important economic losses. Comparing curves of the development of the average height of barked and unbarked stands they came to a mean difference in wood prices in the stands amounting to CZK 266 000 per ha. A considerable impact on the economics of management of the Křtiny TFE can be expected because of the fact that the substantial part of damaged stands will reach the felling age roughly in the same period, profits from wood will be markedly decreased and, moreover, it will be necessary to ensure their regeneration. Economic impacts or their undesirable accumulation in the period of a felling age of the majority of damaged stands can be reduced by preventive measures consisting in the gradual regeneration of stands using all available tools of forest management.

In markedly damaged stands, it is not possible to expect the increment of wood and the growing stock is rather depreciated in the course of time. Moreover, the situation will be very probably complicated (with respect to the fact that it refers to the 3rd and 4th forest vegetation zones) by the climatic change impacts. It is also possible to suppose that impacts of damage to forest stands will deepen changing economic conditions in timber market.

With respect to the huge extent of damage it is not possible to recommend areal reconstruction of stands which should be applied only in the youngest stands with a substantially damaged structure. In older stands, the existing admixture of beech as a source of diaspores for natural regeneration should be supported.

SOUHRN

Poškození smrkových porostů loupáním a následnými hnilobami na LÚ Proklest, ŠLP Masarykův les Křtiny (Drahanská vrchovina)

Na území LÚ Proklest ŠLP Masarykův les Křtiny byl proveden podrobný průzkum poškození lesních porostů loupáním jelení zvěří. Loupáním bylo poškozeno 85 % porostů, ve většině případů (70 %) se jedná o poškození mírné (1-25 % poškozených stromů). Poškození vzniklo u většiny porostů v období, kdy se jejich věk pohyboval v rozmezí 15-30 let. Největší podíl tvoří škody z let sedmdesátých. Po osmdesátých letech vznikalo poškození již jen výjimečně, škody z 90. let byly zaznamenány pouze v mladých porostech do 30 let věku ve střední části LÚ Proklest, poškození vzniklé po roce 2000 nebylo zjištěno.

Pro podrobné stanovení rozsahu hniloby a jejího postupu v kmenech bylo založeno sedm zkusných ploch 50 x 50 m. Na těchto plochách bylo stromy zařazeny do kategorií: zdravý strom, poškozený strom a poškozený strom s hnilobou. Celkem bylo hodnoceno 1512 stromů. Podíl poškozených stromů ve věkových třídách kolísá, celkově bylo poškozeno 79 % všech monitorovaných stromů. Podíl stromů s hnilobou klesá, od 86 % ve II třídě k 72 % ve IV třídě, celkově šlo o 82 % všech stromů s poraněním.

Na plochách bylo dále vybráno 38 vzorníků, které byly skáceny a dále detailně zkoumány. Vzorníky byly kráceny na metrové sekce až do výšky průniku hniloby pevníku krvavějícího, v případě že hniloba nebyla na konci sekce už vůbec patrna, byla sekce ještě rozpůlena. Pro všechna čela jednotlivých sekcí byly vyhotoveny digitální snímky a ty biometricky změřeny v programu LUCIA. Průměrná procentická ztráta dřevní hmoty (podíl hmoty části kmene s přítomností hniloby z celkové hmoty vzorníku) je nejvyšší u vzorníků ve II věkové třídě – 38 %. Hniloba pronikala do vzorníků skrze poškození ve výši cca 1,3 m – 1,5 m, odkud se šířila rychlostí 1 – 36,4 cm za rok. Hnilobou bylo zasaženo od jedné metrové sekce až po šest metrových sekcí. Znehodnocena tak byla nejcennější část kmene, hnilobou bylo zničeno od 0 % do 66,8 % objemu dřeva sekcí kmene s přítomností hniloby, v průměru 42,62 %.

loupání, hniloba pevníku krvavějícího, jelen lesní, znehodnocení dřevní hmoty

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