

ASPECTS REGARDING THE CONSUMPTION ISSUES IN TIMBER HARVESTING TECHNOLOGY. CASE STUDY

Popa Horia Virgil*, Timofte Adrian Ioan**, Budău Ruben**

*S.C. Vârfu Inalt, 1B Velența St., 410491 Oradea, Romania, e-mail: popahoria18@yahoo.com

**University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: adi_timofte@yahoo.com, rubenbudau2014@gmail.com

Abstract

In this paper we present the calculation of technological losses in logging. Lot 723 M.U. II Moliviș, Remeți Forest District, Bihor Forest Department was chosen as a study case; the optimum exploitation and volumes to be exploited and technological losses on work operations have been determined. The estimation of wood losses from lot 732 is 57.01 m³, representing 3.73% of the gross volume. At the end of the paper some recommendations on waste recovery opportunities resulting from logging are presented.

Key words: technological loss, wood collecting, wood waste, consumption norms/standards

INTRODUCTION

In the exploitation process, through the transformation operations of the wood from the trees valued in the gross wood assortments, inherent reductions in the original volume called *technological losses* (Horodnic, 2003) are produced. Technological losses resulting from felling or collection operations are losses of timber required for logging, losses seen by some businesses as waste that are not recovered.

Wood wastes represent a set of products and materials whose origin is found in all stages of the timber industry, from logging to the manufacture of the finished products. Also scrap wood (boxes, crates, pallets) represents not a negligible amount (Timofte, 2004).

In Romania, according to GD. 856 / 16.08.2002 (OJ no. 659 / 05.09.2002), wood waste is classified according to its origin (according to Timofte, 2004): Code 02 - wastes from agriculture, forestry, hunting and fishing, food preparation and processing; 020107 - wastes from forestry; Code 03 - wastes from wood processing and the production of boards and furniture, paper pulp, paper and cardboard; 0301 - wastes from wood processing and the production of boards and furniture; 0302 - wastes from wood preservation.

MATERIAL AND METHODS

To calculate the technological consumptions coming from logging, the Evaluation Report 723 was studied within Bihor Forestry Department,

Remeți Forest District, Management Unit (M.U.) no. 2, Compartment 52, landscape planners, felling area called Moldovanu, with an area of 15.9 ha.

Stand features: - Stand composition is 4Spruce4Fir-tree2Beech, progressive cutting 2, aged 135 years, diameters between 48 and 56 cm, height 30 m, average tree volume Fir-tree - 3.07 m³, Spruce - 2.23 m³, number of trees marked Fir-tree - 103 trees, Spruce- 543.

RESULTS AND DISCUSSIONS

Compartmentalization of felling area is made in sections by using a single mode of collection complying the maximum collection distances. The map was planimetered with SAKKIA Digital Planimeters.

Table 1

Correction of size sections

No. crt.	Size measured sections, S _i (ha)	Size matched sections, S _i comp (ha)
1	1,6	1,6
2	11,2	11,1
3	3,2	3,2
Total	S _{tot} = 16,0	S _{tot} comp = 15,9

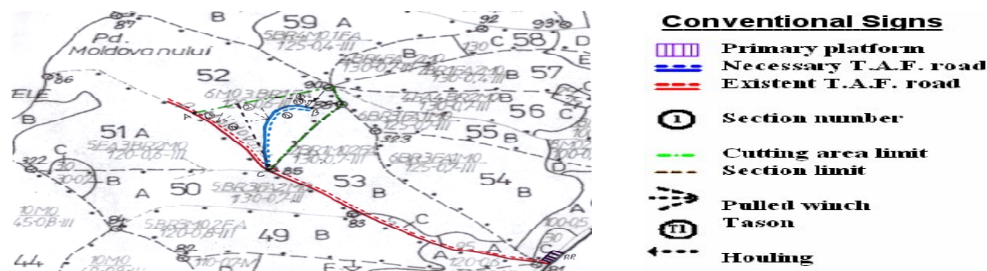


Fig. 1 Sketch prosecution for cutting area no. 723 u.a. 52

Table 2 shows the structure of the wood to be exploited on species or groups of species. Gross volume, bark volume and gross volume without bark being taken from the Evaluation Report.

The exploitation method proposed in the Evaluation Report is trunks and poles. For the exploitation solution, skidding was chosen on section 1 and pulling by winch on sections 2 and 3.

For sections 1 and 2 hauling will be made on section B - C - PP being a necessary road, a section BC is a tractor road with the length of 782 m, and an average slope of 36%.

Technological consumptions are given for each operation: felling, trimming, tearing, oversizes, skidding and pulling by winch. Consumption standards are taken from Ciubotaru, 1996.

For timber harvesting operations, felling, trimming, volume V₁ from Table 2 will be used and for skidding and winch-pulled operations V_{3a} and

V_{3b} from Table 2 will be used. The total technological consumptions is determined in Table 5 and the distribution of technological consumption activities is presented in figure 2.

Table 2

Structure of exploited wood			
No.. crt.	Specifications	UM	Species, group of species
			Coniferous
1	Gross volume with bark	m ³	1529
2	Working bark	m ³	125
3	Gross volume without bark	m ³	1404
	a - thick wood work	m ³	1295
	b - thin wood work	m ³	2
	c - firewood d > 5 cm	m ³	39
	d - limbs d < 5 cm	m ³	68

Table 3 shows the dimensional assortments for each section.

Table 3

Mass distribution softwood sections							
Section number	Section number compensated, Si comp in ha	Assortments dimensional production Vi Coniferous, in m ³ :					
		gross	thin	small		total	Total without limbs
				ster	limbs		
1	1,6	130	0,2	4	7	141,2	134,2
2	11,1	904	1,4	27	47	979,4	932,4
3	3,2	261	0,4	8	14	283,4	269,4
Total	Stot comp = 15,9	1295	2	39	68	1404	1336

Table 4 shows the volumes to be collected by tractor, land gradient in degrees and percentages and average hauling distance (d_m) of wood.

Table 4

Estimation of distances out / close by tractor (recommended slope <40-45%)						
Route	Inclination		Tasonul	Volumue Vi, in m ³	Distance, in m	
	(°)	(%)		Coniferous	Horizontal d _{0i}	Real d _i
A - PP	17	30	T3	269,4	1550	2091
B - C - PP	18	32	T1	134,2	1820	2455
	17	31	T2	932,4	1670	2265
Total	-	-	-	1336	-	d _m = 2249

Table 5

Technological consumption of wood for match 723				
No.. crt.	Operations	Volume, [m ³]	Technological consumption , [%]	Losses, [m ³]
1	Harvest and trimming cutting primary	1529	0,18	2,75
2	Cut to final trimming	1529	0,42	6,42
3	Ruptures in felling	1529	0,05	0,76
4	Tolerances in shaping the final	1529	0,95	14,53
5	Houling	1297	2,28	29,57
6	Pulled winch	1297	0,23	2,98
TOTAL		-	3,73	57,01

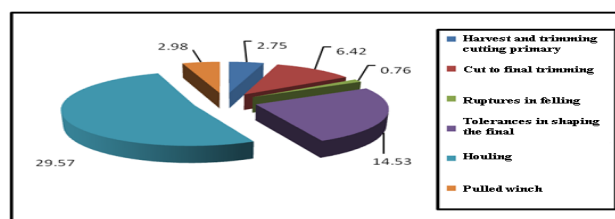


Fig. 2. Distribution of technological consumption activities

CONCLUSIONS

For the analyzed case study the calculated technological consumptions are of 3.73% representing 57.01 m³. According to Fig. 2 hauling has the largest loss (29.57 m³), followed by trimming tolerances (14.53 m³). In Bihor county, in 2012 were exploited 71900 m³ coniferous wood. Technological consumptions were of 2681.97 m³, representing 3.73% of the exploited wood. In practice, small thin material is not collected and properly capitalized due to high transportation costs. Often even cracked floors remain cutting area, their recovery being unprofitable. In this case cracked floors represented 4.47% of the total volume. Their harness to the local population is recommended. For turning the superiority of wood waste is necessary to purchase mobile shredders for wood chopping finely cracked tape, parts of trees that can not be directly monetize and thickening forest road network and networks collecting prosecutors. Wood waste process facilitates the chips can be used to produce bio fuel (pellets, briquettes) to produce semi precast (chipboard or MDF) for furniture industry, smoking food products, animal litter and more.

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