

LEGISLATIVE AND ORGANIZATIONAL ISSUES CONCERNING THE RANGE OF MACHINES USED IN LOGGING

Timofte Adrian Ioan*, Timofte Claudia Simona**, Budău Ruben*

* University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: adi_timofte@yahoo.com, budauruben2014@gmail.com

***University of Oradea, Faculty of Law and Jurisprudence, 26 Gen. Magheru St., 410048 Oradea, Romania, e-mail: clau_timofte@yahoo.com

Abstract

The study presents the importance of accurate determination of the equipment needs used in the forest exploitation activities. It is also presented the obligation of the economic agents to have their own equipment specific to forest exploitation activity which is necessary to achieve the exploitation certificate. The present legislation specifies the calculus mode of the annual exploitation capacity according to the company's equipment. As regards the optimum planning of the exploitation activities and to respect the period agreed in the exploitation authorisation, the economic agent should establish the number of equipment with which it will work in each coupe and the way it will distribute the activities according to a calendar in a professional way. Ten coupes that were put to auction at the beginning of 2016 by Bihor Forest Administration were chosen as a case study, wherein some main cuttings will be executed. The coupes under study were found at the respective moment at an average distance of more than 1500m (accessibility grade G5). The calculus procedure of the equipment may be extended for any coupe. The factors that influence significantly the number of equipment are: exploitation period; accessibility grade, gross volume and volume of average tree. The time norms take into account other exploitation factors, such as: exploitation method and technology, range of machines and performance of the used equipment, field conditions, factors related to the stand, etc.

Key words: exploitation certificate, certification criteria, time norms, exploitation period, moto-saws, forest tractors, accessibility grade

INTRODUCTION

According to Law 86/2008 of the Forestry Code, in art.62, paragraph 1, it is stipulated that the exploitation of coupe is made only after receiving the exploitation authorisation and delivery of the coupe.

In the forest exploitation activity, the number of equipments and workers must cover the development of the operations/activities in the coupe, collecting routes and primary platforms, including the cleaning of the coupe from the exploitation leftovers.

The determination of the minimum number of equipment (N_u) used in the exploitation of timber is made according to the necessary time (FT, in hours), the approved exploitation duration according to the exploitation authorisation (in months, or number of active days $N_a \times 8$, in hours), the work team for the respective equipment (fm).

$$N_u = \frac{FT}{8 \cdot N_a \cdot fm}$$

Furthermore, the calculus modality of the minimum number of equipment for 8 exploitation coupe is presented. In this paper, the number of moto-saws and tractors was analysed. The calculus modality for harness is similar and corresponds to the number of joints (teamster). Other equipments that can be used in the timber exploitation, but they are not analysed in this paper, are: bulldozers for making the tractor roads, cableway-skidder when collecting the wood, multifunctional machines when wood collecting, loaders on the primary platform, barking machines, splitters, chippers, etc.

According to Order no. 1330/2015, the economic agent “must make the proof of owning the equipments/harness for the exploitation of a minimum annual volume of 2000 mc”, and the proof can be probed through a certificate released by an administrative-territorial unit. According to the same order, in Art 14, paragraph 1, letter b, the calculus of the annual wood exploitation capacity by an economic operator is made according to the specific equipments that it is endowed with: for a forest articulated tractors 5000mc are given, for a universal tractors equipped for forest exploitation 1500, 3000 or 4000 mc are given according to the power of the engine, for a multifunctional equipment or cableway-skidder according to the technical data, and for a harness – 800mc. These data are filled in according to Annex no. 5 of the Regulation.

MATERIAL AND METHOD

As a case study, ten felling areas that were put up to auction during the period January-February 2016 by Bihor Forest Administration (S1, S2), within Aleşd, Beiuş, Dobreşti, Sudrigiu and Tinca Forest Districts with different volumes of the average tree, found on steep and very steep gradient (20-32°) were chosen. Trimming and shelterwood system cuts will be executed in these stands.

The maximum exploitation periods were taken from the Order 1540/2011 – Annexes 2 and 3 according to the volume to be exploited and the type of coupe (with or without restrictions – given by the treatments and type of cutting). These periods are presented in the table 1.

By the help with a programme designed in Microsoft Excel, the minimum number of equipments was necessary for the extraction of the timber was determined; It was valorise in such a way that the process could be framed in the adopted exploitation duration. Thus, there were determined:

- the minimum number of moto-saws necessary both in the coupe and on the primary platform during the operations of felling, lopping and sectioning;
- minimum number of forest tractors necessary to collect in time the harvested timber.

Table 1

Maximum exploitation durations according to Order 1540/2011 for the coupes under study

Coupe no.	Forest District	Maximum admitted period, in months
203	Aleșd	4
467	Beiuș	5.5
517	Beiuș	4
525	Beiuș	4
235	Dobrești	5.5
192	Sudrișiu	3
212	Sudrișiu	5.5
1001	Tinca	3
1038	Tinca	4
1046	Tinca	4

Based on the time norms used in the forest exploitation, determined by Prof. Ciubotaru (1996) for Stihl, Husqvarna moto-saws and TAF650 tractors, the time (how long these equipments were used) has been determined. By comparing this time found with the number of available hours, the necessary number of equipments is obtained. This number was increased by a factor of 1.25 (was found that 80% of the total time working with this equipment).

Table 2

Calculated number of moto-saws

Exploitation period, in months	Minimum number of moto-saws calculated for coupe....									
	203	467	517	525	235	192	212	1001	1038	1046
5.5	-*	0.26	-	-	0.21	-	0.34	-	-	-
5	-	0.28	-	-	0.23	-	0.37	-	-	-
4	0.05	0.35	0.36	0.24	0.29	-	0.47	-	0.22	0.16
3	0.06	0.47	0.48	0.32	0.39	0.13	0.62	0.24	0.29	0.22
2	0.10	0.71	0.72	0.48	0.58	0.20	0.93	0.36	0.44	0.33
1	0.19	1.42	1.44	0.97	1.17	0.40	1.86	0.73	0.88	0.65

* Order 1540/2011 doesn't foresees this maximum exploitation period

Because the time, respectively the number of moto-saws is directly proportional with the exploited volume, a simulation was made for all the ten coupes for a volume of 1000mc, maintaining the other characteristics from each coupe. The obtained results are presented in the table 3.

For the determination of the number of tractors, the grades of accessibility (given/provided by the collecting distances) and the volumes to be collected are very important. The influence of the grades of accessibility upon the exploitation costs, the labour costs when collecting and the expenses with the fuels for tractors, was studied in “The Influence of the Accessibility Grades upon the Technical-Economical Estimates for the Wood Exploitation” (Timofte et al., 2016).

Table 3

Exploitation period, in months	Minimum number of moto-saws calculated for a necessary volume of 1000mc									
	Minimum number of moto-saws calculated for coupe....									
	203	467	517	525	235	192	212	1001	1038	1046
5.5	-	0.30	-	-	0.22	-	0.39	-	-	-
5	-	0.33	-	-	0.24	-	0.43	-	-	-
4	0.77	0.41	1.05	0.43	0.31	-	0.54	-	0.40	0.89
3	1.03	0.54	1.40	0.58	0.41	0.59	0.72	0.61	0.54	1.18
2	1.54	0.81	2.11	0.87	0.61	0.88	1.08	0.91	0.81	1.77
1	3.08	1.63	4.21	1.74	1.22	1.76	2.16	1.82	1.62	3.54

As in the case of the moto-saws, the calculus was made for 10 coupes each of them having specific conditions; however, it was dealt with a reference volume of 1000mc to analyse the influence of the accessibility grade of the coupe upon the number of tractors necessary for the wood collection (table 4). The collecting distance with a winch is >50m.

Table 4

Exploitation duration, month	Minimum calculated/necessary number of forest tractors (TAF)									
	Minimum calculated/necessary number of TAF for coupe									
	203	467	517	525	235	192	212	1001	1038	1046
5.5	-	0.60/1	-	-	0.60/1	-	0.49/1	-	-	-
5	-	0.66/1	-	-	0.66/1	-	0.54/1	-	-	-
4	0.95/1	0.82/1	0.94/1	0.82/1	0.83/1	-	0.67/1	-	0.82/1	0.95/1
3	1.26/2	1.10/2	1.26/2	1.10/2	1.10/2	1.10/2	0.90/1	1.10/2	1.10/2	1.27/2
2	1.89/2	1.65/2	1.89/2	1.65/2	1.65/2	1.65/2	1.34/2	1.65/2	1.65/2	1.90/2
1	3.79/4	3.30/4	3.77/4	3.29/4	3.31/4	3.29/4	2.69/3	3.30/4	3.29/4	3.80/4

Furthermore, the coupe 235 within Dobrești Forest District was analysed (coupe no. 5 out of the ten coupes under study) having the accessibility grade G5 at present, the volume of average tree being a big one (2.91 mc), the gross volume being of 1197mc, and the gradient of 21°.

Table 5

Determination of the number of tractors necessary for coupe 235, if the accessibility grade would improve from G5 to G1

Accessibility grade	Minimum number of forest tractors (N) necessary for an exploitation duration of					
	5.5 months	5 months	4 months	3 months	2 months	one month
a. Average collecting distance is >50m						
G5	0.72	0.79	0.99	1.33	1.98	3.96
G4	0.65	0.71	0.90	1.20	1.80	3.59
G3	0.57	0.63	0.79	1.05	1.58	3.14
G2	0.51	0.56	0.70	0.94	1.41	2.81
G1	0.48	0.53	0.66	0.88	1.31	2.63
b. Average collecting distance is 16-50 m						
G5	0.69	0.76	0.95	1.26	1.90	3.42
G4	0.62	0.68	0.86	1.14	1.71	3.59
G3	0.54	0.59	0.74	0.88	1.49	2.97
G2	0.48	0.53	0.66	0.94	1.33	2.65
G1	0.45	0.49	0.61	0.82	1.23	2.46

It is noticed that the collecting distance with winch influences very little the minimum number of tractors necessary for coupe P235. For G5, with a duration of one month, the difference is of 0.54 equipments and for G1 the difference is of 0.17 equipments. In percents, the collection with winch represents between 4.20-6.31 % out of the total need of tractors.

RESULTS AND CONCLUSIONS

To obtain the minimum number of moto-saws, the calculated values in Table 3 were increased up to the first integer number.

According to Table 4 – Minimum calculated/necessary number of forest tractors (TAF) – it is noticed that for a period of 3 months, the number of tractors must be of minimum 2 years (with the exception of coupe 212 for which the gradient and the volume of the medium tree are average). For a period of one month, the number of tractors becomes of minimum 4 (3 in the case of coupe 212).

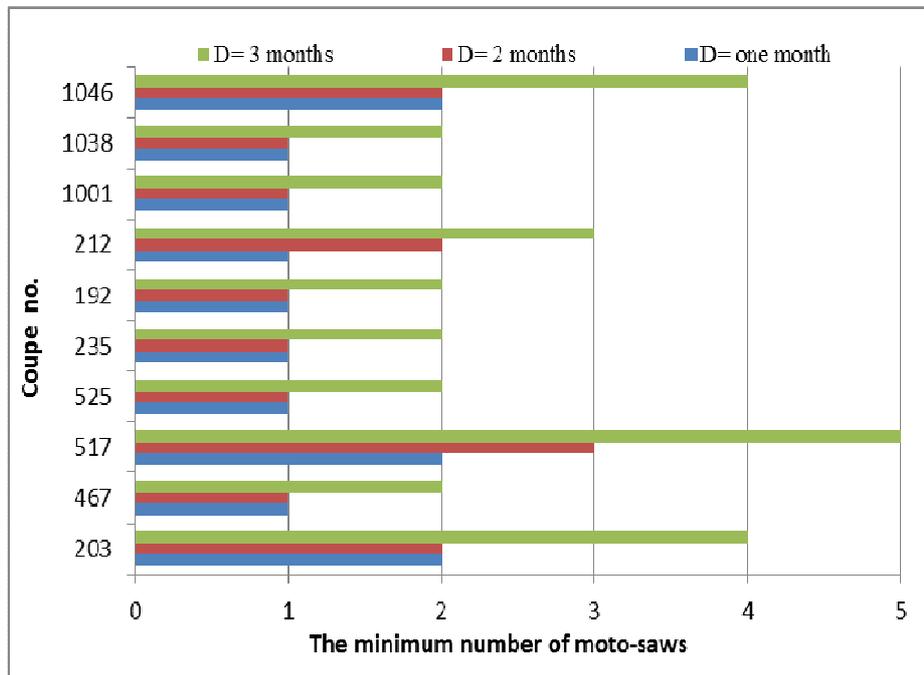


Fig. 1 Representation of the minimum number of moto-saws for an exploitation period (D) of 1-3 months

As regards the necessary number of tractors, according to the data obtained in Table 4, the adopted exploitation period is directly proportional with the number of equipments N. If the exploitation period decreases from 2 months to one month, the necessary number of tractors doubles. For a maximum adopted period of 5.5 months, N=1 regardless the accessibility grade, for a period of 2 months N=2, while for a month adopted as a working period N=3 tractors for G1, G2 or G3 for short and average hauling distances, respectively N=4 tractors for high accessibility grades G4, G5 (fig. 2).

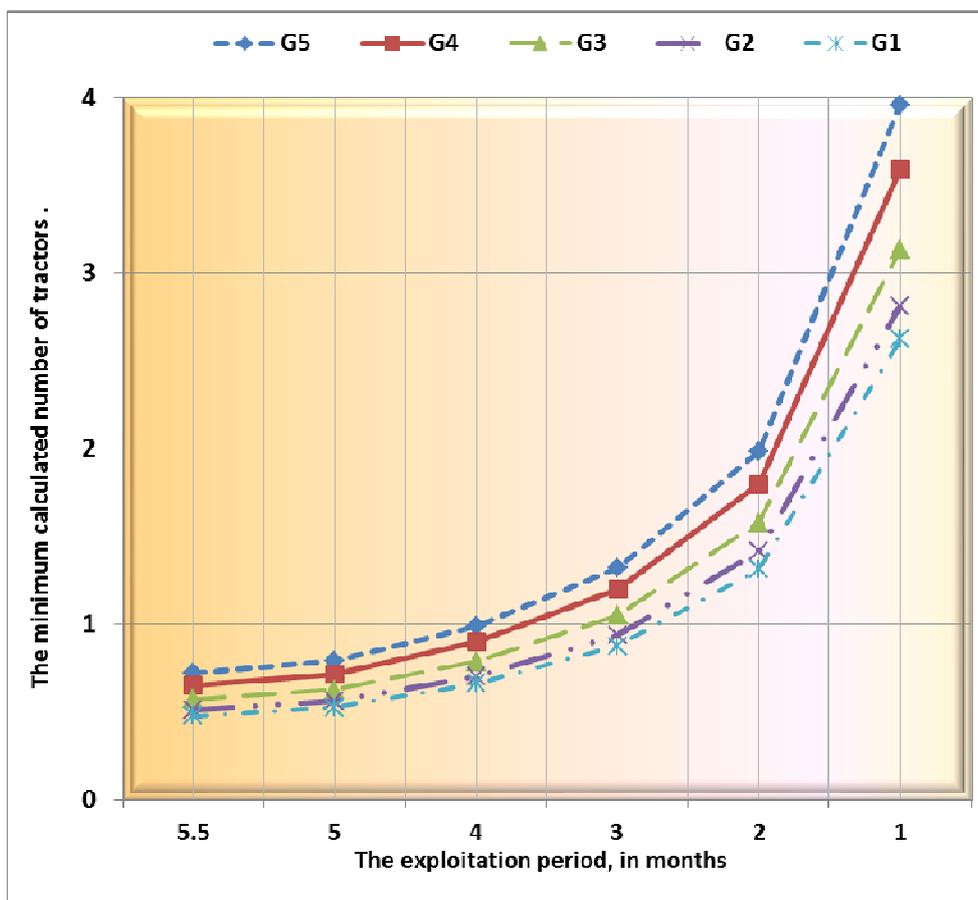


Fig. 2 Representation of the minimum calculated number of tractors according to the exploitation period

It is recommended to avoid the adoption of a very short exploitation period because the number of necessary equipment (integer values) must be double or even triple with respect to the period 3-5.5 months.

In Romania, there should be a focus on the modernization of the working technologies and acquisition of modern equipment. Even the Forest Code foresees as “in the hilly and mountain areas, the technologies based on cableway-skidders to have priority”.

REFERENCES

1. Ciubotaru A., 1996, Elemente de proiectare și organizare a exploatării pădurilor, Ediția a II-a. Editura Lux Libris, Brașov
2. Timofte A. I., Timofte C. S., 2016, The Influence of the Accessibility Grade upon the Technical-Economical Estimates for the Wood Exploitation. The Annals of the University of Oradea. Economic Sciences, Tom XXV
3. ***, 2008 - Legea nr. 46/2008 Codul silvic, republicată la 12 august 2015

4. ***, Ordinul 1540/2011 - Norme privind stabilirea termenelor, modalităților și perioadelor de exploatare a mesei lemnoase din păduri și din vegetația forestieră din afara fondului forestier național
5. ***, 2015 - Ordinul nr. 1330/2015 pentru aprobarea Regulamentului privind organizarea, funcționarea și componența Comisiei de atestare a operatorilor economici pentru activitatea de exploatare forestieră, precum și criteriile de atestare pentru activitatea de exploatare forestieră
6. S1- <http://www.dsoradea.ro/index.php?idmenu=128&sub=286&vanzari=128>
7. S2 - <http://licitatii.rosilva.ro/picior/capp.php>