APPLICATION ASPECTS OF THE REGENERATION FELLINGS IN MIXED STANDS OF UP II ZIMBRU, OS GURAHONT, DS ARAD

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Abstract

Mixed stands are forest ecosystems that are characterized by a high degree of complexity and stability. They are usually composed of species of vegetation complementary advertising claims, following the leadership of the stand requiring a special experience.

Regeneration and management of the beech-sessile oak mixed stand of UP II Zimbru, OS Gurahont, DS Arad is a complex problem that requires a complex series of conditions on state-vegetation, accessibility and application of silvotechnic interventions.

Promotion and management of mixed stands with an increasing percentage of participation of oak species is a primary objective and future forest management spent sustainable forestry in the context of potential national forest.

Key words: mixed stands, beech-sessile oak mixed stand, forest management, treatment method, regeneration under shelter, simulation, silvotechnic interventions.

INTRODUCTION

Storey bioclimathic (FD3) holds most of the hills and tableland, mostly fragmented tableland including Moldova, Subcarpatii internal and external, Maramures and Oas depressions, are populated by sessile oak stand slopes sunny and shaded beech stand. Comprises about one quarter of total forest area of the country, after stretching their competing with mixtures of beech with spruce floor. The country of sessile oak and mixtures of sessile oak and beech defended upstream of beech stands sinuous mountain chain. It includes most of the country sessile oak stands.

Note that both upper limit and lower limit of the storey are not clear enough which leaves room to interpretation.

In all forest species quercus occupy 18.5%. Below are the dominant structural report mixed stands, even-aged and relatively even-aged, from seed or sprouts (and mixed) varied in productivity and well differentiated in relation functional.

Being stronger and longer subject to anthropogenic impact most of them have suffered apparent structural changes, and decreased ecosystem stability and potential bioproductive, bioregeneration and ecoprotective. Therefore, management of forests quercus raise extra problems of the most difficult recovery or ecological reconstruction, maintenance and even increase the share quercus and first of oaks and pedunculate oak, which had also the most hard hit. If we take into account that were and are still exposed to premature drying intensive processes that result in future treatments application becomes a task of great responsibility in ecological and economic recovery of the most valuable forest ecosystems of our forest fund.

From an ecological, choice and implementation of treatment will take into account that forests occupy regions quercus tableland, declivitys, hills, plains and meadows, with something more moderate slopes or nearly flat land easily available.

Seedling species quercus claims for sustainable development sufficient light, heat, moisture and food, it has provided benefits if full light from above but also an effective side shelter to prevent dry summer in the soil horizon which develops juveniles (from Florescu, Nicolescu 1998, after Hell, 1924; Vanselow, 1931).

It is also known that in competition with other species mixed seedling quercus is disadvantaged because of mixed species often fructification, abundant, and grows more actively than their quercus seedling (from Florescu, Nicolescu 1998, after his Ciumac, 1967).

MATERIAL AND METHODS

Objectives of case study aims to investigate the phenomenon forestry possibilities in structural and functional complexity and technical decisions that are required to be implemented to realize the objectives of forestry household.

Following a diagnosis will be achieved silvotechnics to be justified on the basis of technical measures proposed. Also will examine the possibilities of implementation in current practice of proposed solutions at the realization that the case study and sustaining technologies which can effectively serve current needs.

The case study was conducted in forest stands of compartment 51A and 53A respectively which are engaged in forest exploitation-regeneration process included in the management plan.

Research methods used in conducting the case study:

-Counting statistics of forest stands

-Observations on the itinerary and stationary in regeneration points, and considering the implementation of interventions and improvement cutting .

-Simulation is to use specialized soft - PROARB regeneration fellings in the simulation.

-The comparison was done using tables of production, forest management plans and specialized software - FOND, Excel tool for analysis of objective reality on the ground reported in normal conditions.

Inventory partial (or selective statistics) is based on the consideration that the stand is a population statistic.

In this context all samples plot (SSpi = E) is the sample selection or a community that is extracted from the population.

Statistical-mathematical analysis carried out on observations obtained by sampling is to inform the closeness of the sample and the population in terms of a sample plot and the population.

The main aspects of statistical inventories are:

- the form of the sample plot;
- size of the sample plot;
- number of sample plot;
- module location of the sample plot.

In form of sample plot have experienced a number of forms as follows: square, rectangle, circle. It was found that the most commonly used is the circular.

About the optimal size of the circular sample plot was shown that the value of such areas should be between 100-500 m^2.

In this case study were taken from the sample plot of 500 m^2 (for even aged-stand exploitable consistency between 0,5-0,6), with variable radius, depending on the inclination of the land.

Number of sample plot was determined by the formula:

$$n = \frac{t^2 \times s_{\%}^2 \times F}{F \times \Delta_{\%}^2 + t^2 \times f \times s^2{}_{\%}} \qquad (1)$$

where:

-n- number of surveys;

-d- distance between sampling;

-F- stand area;

-$\Delta_{\%}$- allowable tolerance;

-t-coverage probabilities corresponding coefficient taken into account;

-f- place the sample size;

-$s_{\%}$- coefficient of variation of volumes on the stand (the statistical unit instead of sample).

RESULTS AND DISCUSSION

Table 1

Track of the number of trees, basel area and volume on categories of diameter and species per hectare in the stands of u.a. 51A and u.a. 53A

D (cm)	u.a. 51A			u.a. 53A		
	Stand (buc/ha)	G_{stand} (m^2/ha)	V_{stand} (m^3/ha)	Stand (buc/ha)	G_{stand} (m^2/ha)	V_{stand} (m^3/ha)
10	1	0.008	0.028	0	0	0
12	3	0.034	0.156	1	0.011	0.047
14	1	0.015	0.087	0	0	0
16	0	0	0	0	0	0
18	2	0.051	0.384	1	0.025	0.277
20	2	0.063	0.526	2	0.062	0.474
22	1	0.038	0.347	3	0.114	1.23
24	3	0.136	1.488	2	0.09	0.806
26	4	0.212	2.228	5	0.265	3.264
28	5	0.308	3.579	4	0.248	3.087
30	9	0.636	7.573	12	0.852	10.72
32	9	0.724	8.957	13	1.04	12.42
34	12	1.090	13.829	12	1.092	13.36
36	13	1.323	17.415	12	1.224	15.332
38	10	1.134	15.454	7	0.791	9.667
40	13	1.634	22.619	12	1.512	18.888
42	9	1.247	17.703	13	1.807	23.14
44	7	1.064	15.463	7	1.064	13.993
46	5	0.831	12.335	7	1.162	15.631
48	10	1.810	27.41	9	1.629	22.32
50	9	1.767	26.97	8	1.568	21.936
52	5	1.062	16.67	8	1.696	24.144
54	3	0.687	10.965	1	0.229	3.309
56	3	0.739	11.976	3	0.738	10.842
58	4	1.057	17.38	4	1.056	15.736
60	5	1.414	23.575	8	2.264	34.152
62	3	0.906	15.303	5	1.51	23.095
64	4	1.287	22.016	9	2.898	44.856
66	2	0.684	11.85	0	0	0
68	1	0.363	6.362	1	0.363	5.761
70	3	1.155	20.451	0	0	0
72	3	1.221	21.87	1	0.407	6.602
74	1	0.430	7.78	0	0	0
76	0	0	0	2	0.908	15.014
78	0	0	0	-	-	-

80	0	0	0	-	-	-
82	0	0	0	-	-	-
84	0	0	0	-	-	-
86	2	1.162	22.22	-	-	-
Total	**167**	**26.290**	**402.969**	**172**	**26.625**	**370.103**

Analyzing data from the table 1 note that:

-number of trees to stand in u.a 51A is 167 pieces / ha was lower than normal number of trees recommended for yield tables, in this situation the density index (IN) is 0.43;

-basel area for the stand of u.a. 51A is 26, 290 m^2/ha, being low compared with the normal basel area of the yield tables recommended in this situation the density index (IG) on the basel area is 0, 64.

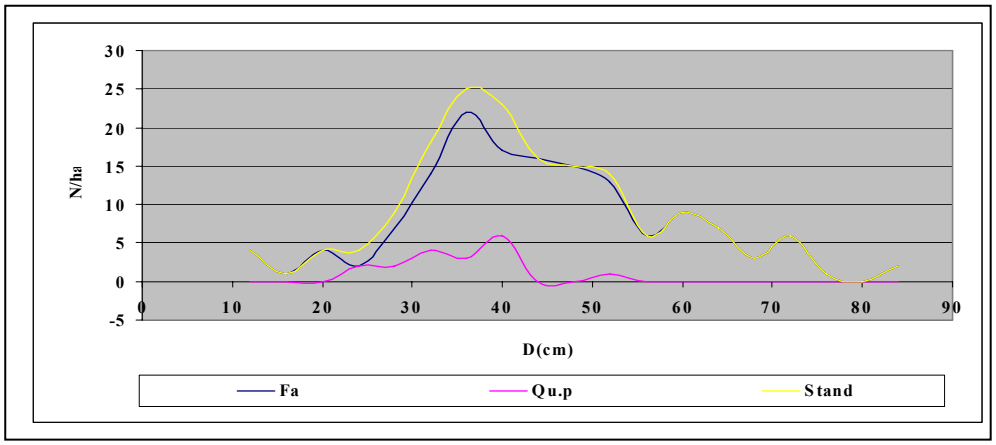


Fig. 1. Distribution by category of number of trees per hectare in diameter and species stand of u.a. 51A

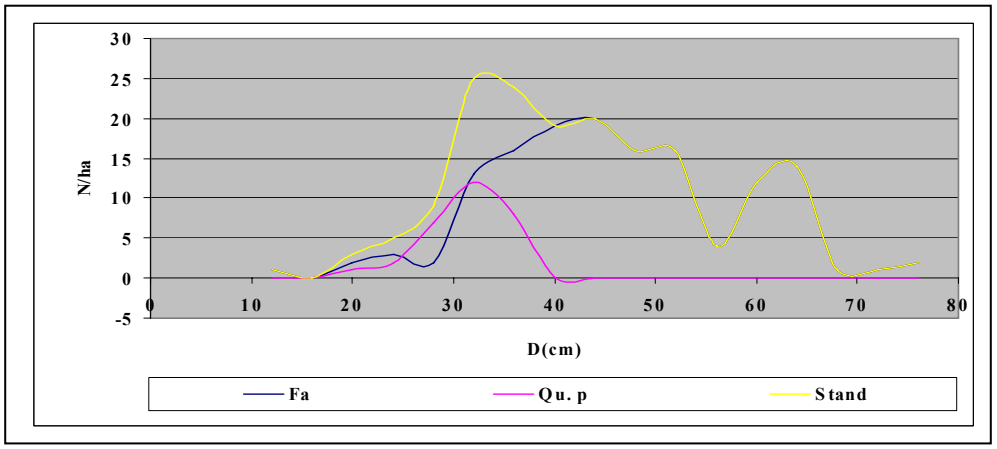


Fig. 2. Distribution by category of number of trees per hectare in diameter and species stand of u.a. 53A

-stand volume from the u.a. 51A is normally recommended for yield tables with volume less than 402.969 m^3/ha, in this situation index density by volume (IV) is 0.63;

-number of trees to stand in u.a 53A is 172 pieces / ha was lower than normal number of trees recommended for yield tables, in this situation the density index (IN) is 0.32;

-basel area for the stand of u.a. 53A is 26.625 m^2/ha, is the smallest compared with the normal basel area of the yield tables recommended in this situation the density index (IG) on the basel area is 0, 64

-stand volume from the u.a. 53A is normally recommended for yield tables with volume less than 370.103 m^3/ha, in this situation index density by volume (IV) is 0.77;

Taking into account the objective situation of the land following completion of field observations for proper stand of u.a. 51A propose group shelterwood system for an appropriate development of the seedling installed (fig. 4) and that for extracting the allowable cut set.

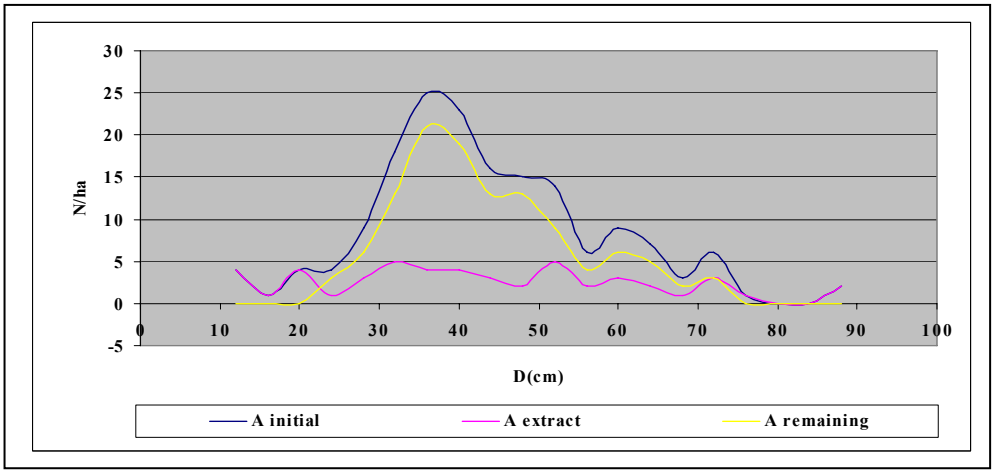


Fig. 3. Dynamic number of trees on the categories of diameter, per hectare in the stand of u.a. 51A, which will be made by groupsfelling

Trees extract were established on the ground taking into account the dynamic regeneration of this installation involved in forest exploitation and local experience gained over time. $I_{N\%} = \frac{50}{167} \times 100 \cong 30\%$, $I_{G\%} = \frac{8,506}{26,292} \times 100 \cong 32\%$,

$I_{V\%} = \frac{136,396}{402,969} \times 100 \cong 34\%$

Taking into account the objective situation of the land following completion of field observations for proper stand of u 53A propose group shelterwood system for an appropriate development of the seedling installed (fig. 6) and that for extracting the possibility set.

Fig. 4 Natural regeneration in a mixed stand of sessile oak and beech

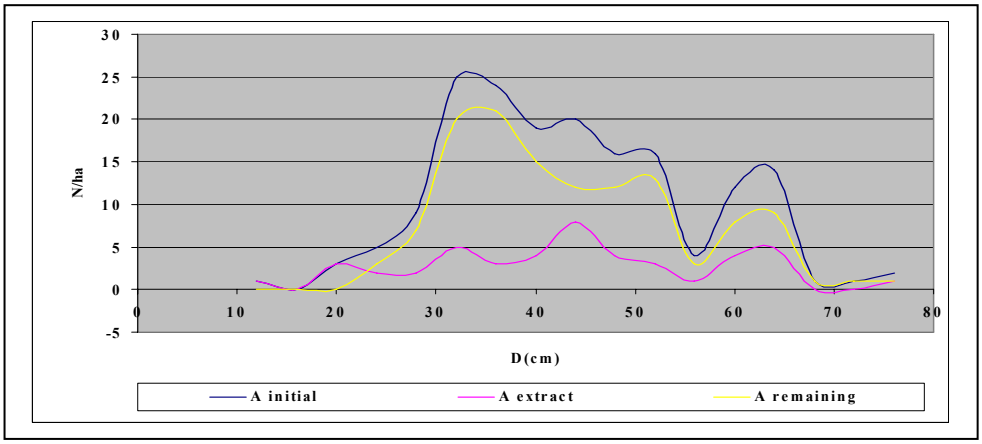


Fig. 5. Dynamic number of trees on the categories of diameter, per hectare in the stand of u.a. 53A, which will be made by groupsfelling

Trees extract were established on the ground taking into account the dynamic regeneration of this installation to remove - close and local experience gained over time.

$$I_{G\%} = \frac{7{,}301}{26{,}625} \times 100 \cong 27\%, I_{N\%} = \frac{46}{172} \times 100 \cong 27\%, I_{V\%} = \frac{101{,}451}{370{,}103} \times 100 \cong 27\%$$

Fig. 6. Regeneration point of species sessile oak and beech

For simulation and presentation of proposed interventions in the stand of u.a. 51A has been done to achieve that profile and tridimensional model of the stand before and after intervention using the PROARB.

Data entry in the program are presented in tables 2 and 3.

Table 2

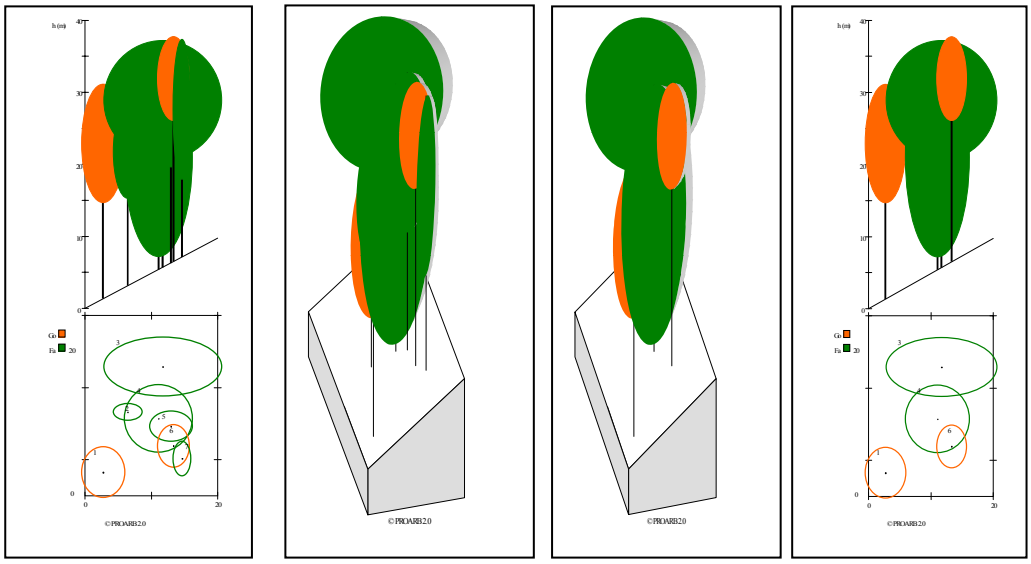
Before intervention u.a. 51A

Data on standing trees								
No. crt.	**X (m)**	**Y (m)**	**Dc1 (m)**	**Dc2 (m)**	**H (m)**	**He (m)**	**Specie**	**No. trees**
1	2.706	3.258	6.52	7.01	29.8	13.4	Go	7
2	6.409	11.636	4.314	2.362	25.1	12.2	Fa	**Slope**
3	11.706	17.937	17.72	8.23	31.5	14.9	Fa	26
4	11.068	10.737	10.268	9.346	29.4	1.8	Fa	**Length profil**
5	12.951	9.633	6.412	4.17	30.5	13.3	Fa	20
6	13.312	6.923	4.833	5.96	31.2	19.6	Go	**Width profil**
7	14.616	5.177	2.718	4.803	30.2	10.8	Fa	25

Table 3

After intervention u.a. 51A

Data on standing trees								
No. crt.	**X (m)**	**Y (m)**	**Dc1 (m)**	**Dc2 (m)**	**H (m)**	**He (m)**	**Specie**	**No. trees**
1	2.706	3.258	6.52	7.01	29.8	13.4	Go	4
3	11.706	17.937	17.72	8.23	31.5	14.9	Fa	**Slope** 26
4	11.068	10.737	10.268	9.346	29.4	1.8	Fa	**Length profil** 20
6	13.312	6.923	4.833	5.96	31.2	19.6	Go	**Width profil** 25



a.) Stand before the intervention b.) Stand after the intervention

Fig. 7. Simulation of the intervention in stand of u.a. 51A route to groupsfelling in horizontal, vertical and 3D projections

Table 4

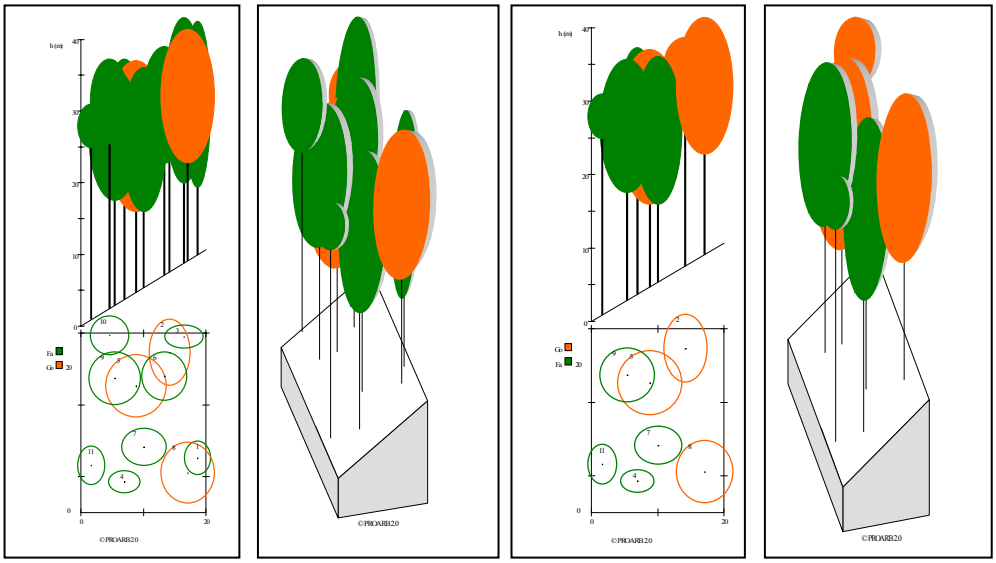
Before intervention u.a. 53A

Date privind arborii in picioare								
Nr. crt.	**X (m)**	**Y (m)**	**Dc1 (m)**	**Dc2 (m)**	**H (m)**	**He (m)**	**Specia**	**Nr. de arbori**
1	18.647	7.604	4.19	4.645	32.6	9.4	Fa	11
2	14.163	22.344	6.504	9.209	31.2	23.5	Go	**Panta**
3	16.463	24.507	6.15	3.234	34.3	11.2	Fa	28
4	6.924	4.297	4.98	3.108	33.6	19.8	Fa	**Lungime profil**
5	8.796	17.661	9.67	8.69	32.4	11.3	Go	20
6	13.338	19.052	7.204	6.74	31.9	15.6	Fa	**Latime profil**
7	10.053	9.147	7.103	5.2	30.7	10.6	Fa	25
8	17.064	5.562	8.52	8.546	32.3	13.7	Go	
9	5.396	18.757	8.24	7.358	32.8	14.7	Fa	
10	4.52	24.718	6.16	5.446	34.9	23	Fa	
11	1.632	6.568	4.32	5.367	30.1	24	Fa	

Table 5

After intervention u.a. 53A

Date privind arborii in picioare								
Nr. crt.	**X (m)**	**Y (m)**	**Dc1 (m)**	**Dc2 (m)**	**H (m)**	**He (m)**	**Specia**	**Nr. de arbori**
2	14.163	22.344	6.504	9.209	31.2	23.5	Go	7
4	6.924	4.297	4.98	3.108	33.6	19.8	Fa	**Panta**
5	8.796	17.661	9.67	8.69	32.4	11.3	Go	28
7	10.053	9.147	7.103	5.2	30.7	10.6	Fa	**Lungime profil**
8	17.064	5.562	8.52	8.546	32.3	13.7	Go	20
9	5.396	18.757	8.24	7.358	32.8	14.7	Fa	**Latime profil**
11	1.632	6.568	4.32	5.367	30.1	24	Fa	25



a.) Stand before the intervention b.) Stand after the intervention

Fig. 8. Simulation of the intervention in stand of u.a. 53A route to groupsfelling in horizontal, vertical and 3D projections

The analysis of diagrams of figures 7 and 8 it is observed that the proposed removal of trees which hinder bio-group with seedling to ensure optimal installation and its development.

CONCLUSIONS

The stand of u.a. 51A was found that the current composition is different from the composition recommended by management plans.

Index of density on number of trees has a value of 0.43, the index of the basel area density has a value of 0.64, and the volume density index has a value of 0.63, so stand studied was of course the regeneration felling.

The stand of u.a. 53A was found that the current composition is different from the composition recommended by management plans.

Index of density on number of trees has a value of 0.32, the index of the basel area density has a value of 0.73, and the volume density index has a value of 0.77, so stand studied was of course the regeneration felling.

Usable seedling is found uniformly distributed edge fertile species, stand is constructed of beech and oak featuring a state of active vegetation maintenance works are needed on an area of about 3.65 ha.

In forest stands in compartments 51A, 53A have highlighted elements of oak stands in the species of higher productivity (second - site class) which presents a very good state of vegetation and full mast.

Access to these stands was facilitated in the past 10 years through the implementation of forest roads, the reason being able if necessary to achieve a number of works with high intensivity.

Regeneration is present in good condition, bio-group of seedling of beech species presents an active force development.

Considering the issues outlined above on the forest stands studied may recommend the following:

-In the forest stands in compartments 51A and 53A is recommended to promote mixtures of sessile oak and beech, capitalizing fruit-body years in the two species without sessile oak reduce the percentage of participation.

-Should be avoided as much as possible the sudden illumination of specimens of species of sessile oak trunks to prevent canopy process very common among these species.

-It is recommended to further the development of forest roads which serve stands involved in the process of forest exploitation - regeneration, for implementation of very intensive interventions.

-Considering the higher qualities which presents elements of sessile oak species is recommended in future treatment very carefully to the stand which could be a real source of seed stands and why not reserve seeds.

-It is recommended that the recovery of wood base material to be made by service providers, which would bring added benefit Forest District.

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