

NATURAL REGENERATION OF MIXED BEECH STANDS

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ABSTRACT

*Natural regeneration is very common in Romanian forests. One of the most important tree species is *Fagus sylvatica*. It is known that beech juveniles have greater abilities to survive and grow in shade so shelterwood regeneration methods are common for natural regeneration of this tree species. In order to put in evidence the best regeneration method, 15 mixed beech stands have been analysed in a hilly and mountain area from the West part of Romania. The aim of this research is to highlight the best regeneration methods in order to assure a successful reestablishment by natural means. Research showed that uniform shelterwood system is better than group shelterwood system for beech natural regeneration.*

INTRODUCTION

Providing natural regeneration of trees in a short time and on a larger area is very important in forestry. One of the objectives of forest management practice is to optimize the availability of light for regeneration (Lieffers and Stadt, 1994). Group shelterwood system and uniform shelterwood systems gave best results over time in Romanian forests (Adam et al. 2010a). The aim of this research is to highlight the evolution of regeneration in mixed beech forests from Unit of Production IV Cornet, to adopt the best solutions to ensure regeneration of trees in a short time with minimum cost and desired composition knowing that in mixed stands large canopy openings should promote the growth of the light-demanding oak over the shade tolerant beech (Ligot 2013, Adam, 2010b).

MATERIAL AND METHOD

Researches were made in Unit of Production IV Cornet, Forest District Ana Lugojana from Forest Administration Timis. The forest area of 4125.9 ha is situated in the South-East of the Forest District. From the geographical point of view, the Unit of Production is located between 300m and 1200m in the hilly and mountain area. The climate is specific for Western piedmont with enough amount of precipitation all over the year and an average temperature for the warmest month under 22 degree.

There are almost beech stands, most of them being mixed even age stands with generative regeneration.

Research material is constituted from stands where shelterwood cutting have been made (Table 1). In order to assess the dynamic of natural regeneration, 5 square meters plots have been installed every year. Regeneration surveys composition and area have been established according with "Romanian annual regeneration control".

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Table 1

Elements of stands and natural regeneration

No	Compartment	Area (ha)	Natural forest type	Plan management 2000	Plan management 2012
				Stand composition/ Natural regeneration	Stand composition/ Natural regeneration
Group shelterwood systems					
1	12 E	8.6	4331	5FA4GO1MO / 5FA5GO	7FA2GO1MO / 5FA5GO
2	12 H	3.5	5212	4GO4FA1LA1TE / 5FA5GO	3GO6FA1LA / 5FA5GO
3	29 C	21.5	4212	8FA1TE1DT / 8FA1TE1DT	8FA1TE1DT / 7FA1TE2DT
4	43 D	3.6	4313	10FA / 7FA3DT	10FA / 10FA
5	50 E	8.1	4114	7BR3FA / 10BR	7BR3FA / 6BR4FA
6	51 C	3.3	4114	9BR1FA / 10BR	6FA4BR / 8BR2FA
7	106 B	17.7	4331	8FA1CA1DT / 7FA3DT	8FA2CA1DT1TE / 10FA
8	111 B	25.1	4212	8FA1MO1CA / 6FA3MO1DT	- / 7FA2MO1DT
Uniform shelterwood systems					
9	2 B	4.8	4212	10FA / 10FA	- / 6FA2DR1ME1GO
10	13 A	16.5	4211	8FA1GO1DT / 8FA1GO1FR	- / 8FA1GO1DT
11	20 B	3.0	4212	4FA4MO1DT / 9FA1MO	- / 5FA2MO2GO1LA
12	21 A	6.0	4212	4FA4MO1DT / 9FA1MO	- / 5FA2MO2GO1DT
13	32 A	4.5	4212	10FA / 7FA1TE2DT	7FA2TE1DR / -
14	36	3.9	4211	8FA1DR1DT 8FA2TE	6FA2GO1LA1DT / -
15	123 D	1.9	4212	10FA 9FA1CA	9FA1GO / 10FA
<p>Species: FA-European beech GO-sessile oak TE-linden LA-European larch MO-Norway spruce BR-fir CA-European hornbeam FR-European ash DT – various hardwood DR-various softwood</p> <p>Natural forest type 4114 - Mountain beech forest on skeletal soil with mull flora 4211 - Hilly beech forest with mull flora 4212 -Hilly beech forest on skeletal soil with mull flora 4313 - Mixed beech-hornbeam forest on skeletal soil 4331 - Mixed hilly beech forest 5212 - Mixed sessile oak - beech with mull flora</p>					

RESULTS AND DISCUSSIONS

Natural regeneration dynamic in analyzed compartments, as a result of group shelterwood system and uniform shelterwood system is showed in the figures below (figure 1 and 2).

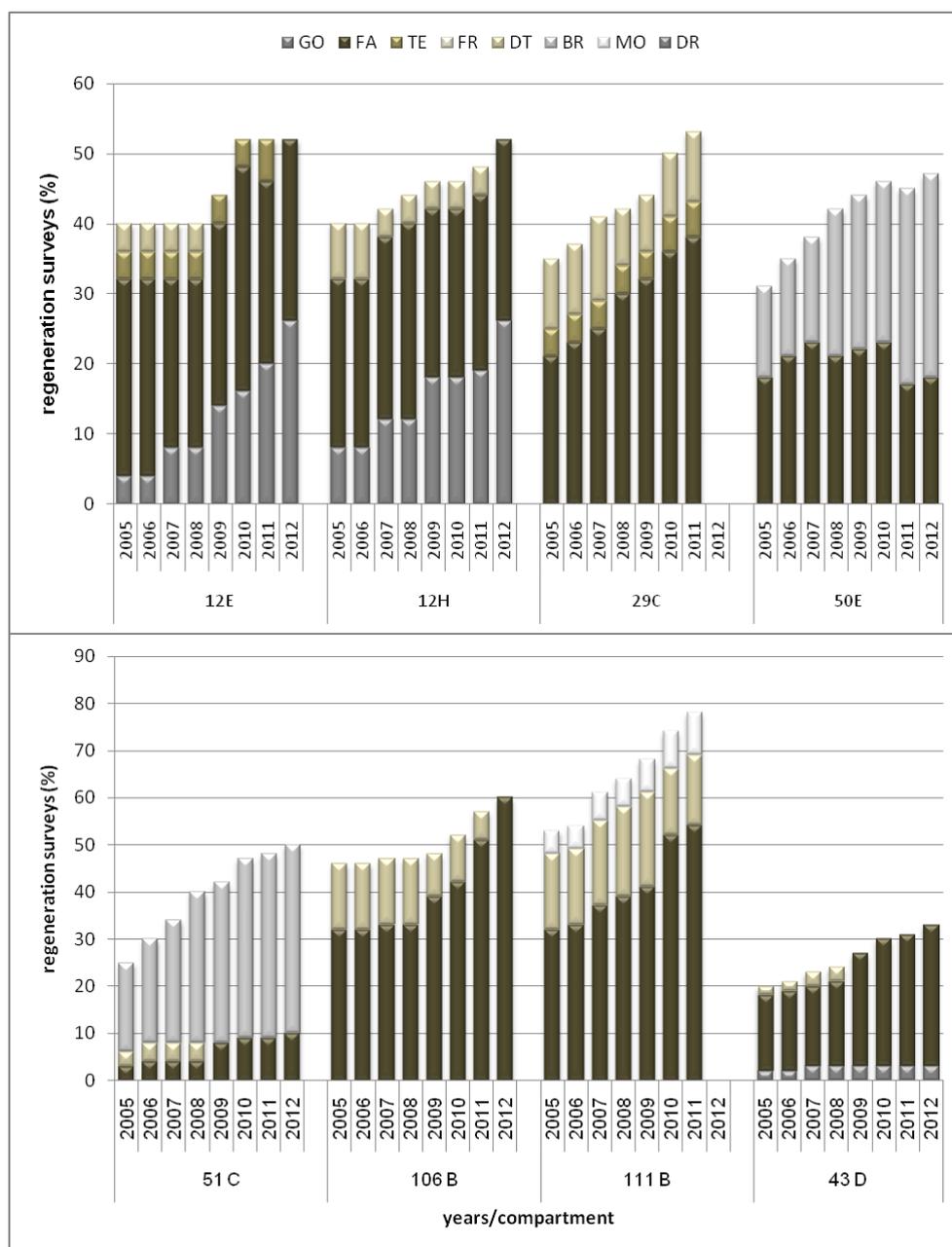


Figure 1 Natural regeneration dynamics in group shelterwood system'

Shelterwood cuttings applied (group shelterwood system) in mixed stands with sessile oak in composition showed an increase of sessile oak juveniles compare with beech juveniles. The things are not the same if we are talking about mixed stands with coniferous (especially fir) or other broadleaves species where an increase of beech juveniles is observed. Hornbeam, birch and black locust are found in the seedlings composition as different broadleaves. These species have been removed in order to help

natural regeneration of the most important species (compartment 12 E, 12 H, 106 B, 43 D). In some compartment, valuable species like sycamore and ash are know like various hardwood (compartment 29 C, 111 B) and have been protected and included in seedlings composition. Two of analyzed compartment are fir in seedlings composition, introduced by direct sowing. In both cases, the sowing has been made before applied treatment. The difference in terms of percentage of fir seedlings comes from the application of release operation.

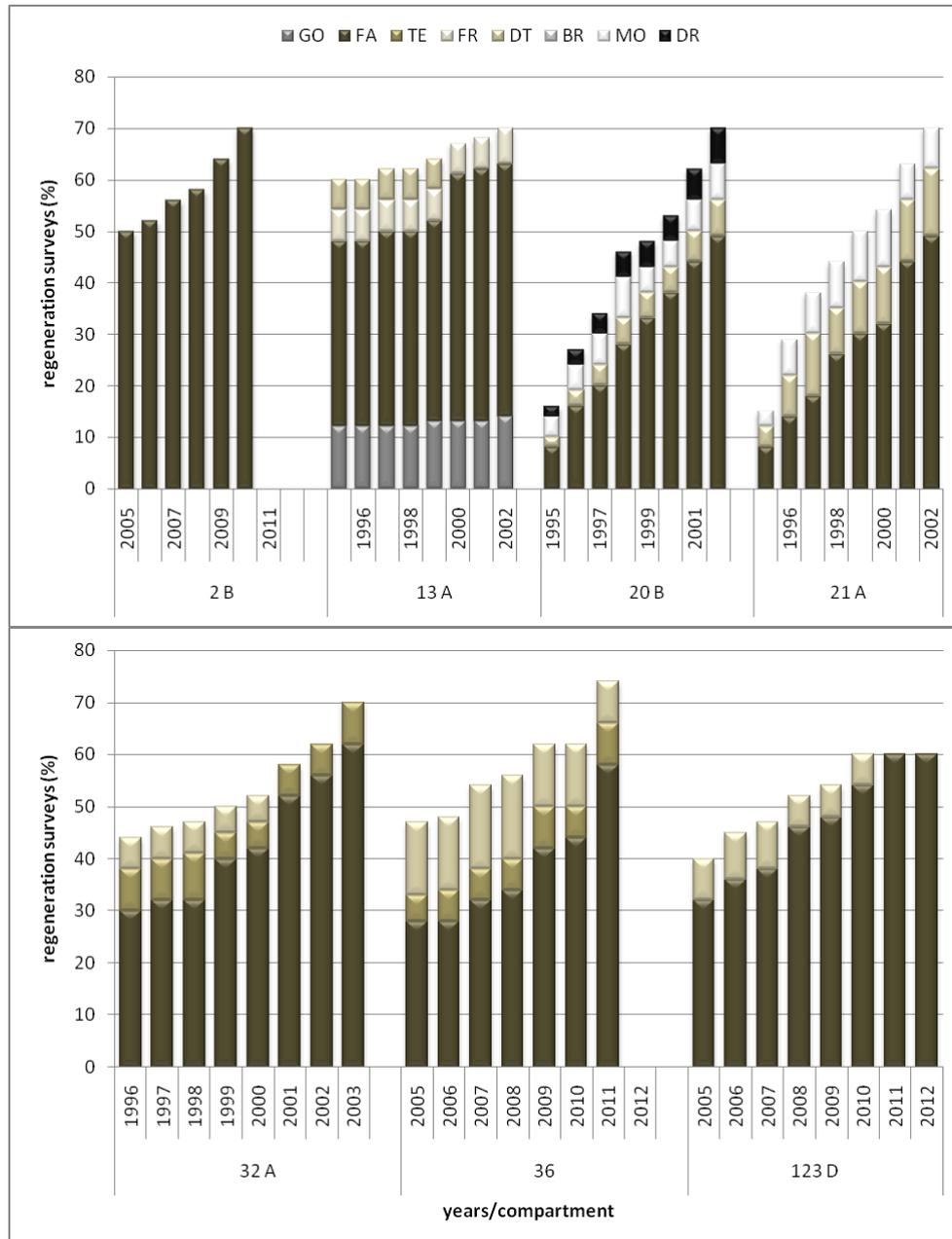


Figure 2 Natural regeneration dynamics in uniform shelterwood system'

In stands where uniform shelterwood system was applied (mixed stands of beech with broadleaves and also mixed stands of beech with coniferous), for analyzed period, a sharp increase of beech juveniles can be seen. Like in previous case, species like hornbeam, birch and black locust has been removed by operation release (13 A, 32 A, 123D). Only valuable species have been kept close to regeneration composition (20 B, 36),

Compare with group shelterwood system the period of regeneration is shorter in uniform shelterwood system (Figure 3).

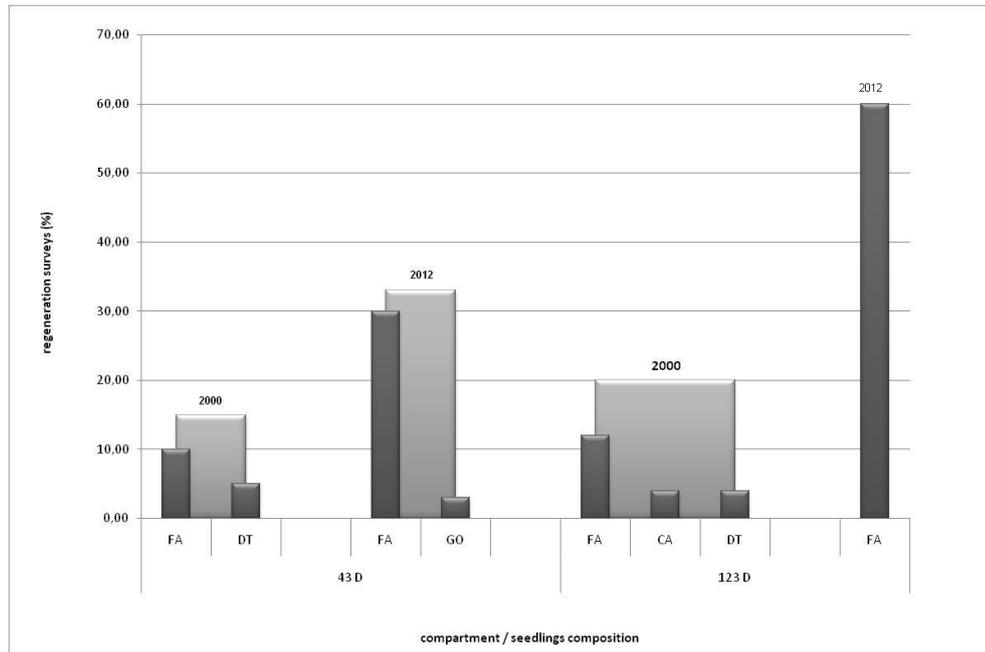


Figure 3. Group shelterwood regeneration (43 D) and uniform shelterwood regeneration (123 D)



Figure 4. Beech regeneration after uniform shelterwood system applied

There is a satisfactory natural regeneration in this unit of production if shelterwood system is applied; in most cases it is not necessary to applied artificial regeneration (Figure 4)

CONCLUSIONS

Research highlight good regeneration in a short period of time for beech stands where uniform shelterwood system was applied.

Also, research showed a very good efficiency for group shelterwood system applied in mixed stands with sessile oak in composition

In conclusion, it can be said that shelterwood system applied; depending on good fructification and release operation at the right time have as a result a very good regeneration, in a short time and with much lower expenses

Currently only group system are applied considering to be more favorable to regenerate an area. The future research results will show whether this system will give the same good results in the case of beech stands or mixed beech and fir as uniform shelterwood system.

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