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WORKS SPECIFIC TO THE INTRODUCTION OF SILVOPASTORAL SYSTEMS IN THE FOREST FUND

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Abstract

The introduction of areas with a different use into the forest fund is relevant for several reasons considering the area of the forest fund in our country which is below the European average. In recent decades, silvo-pastoral systems, represented by common pastures with partially afforested meadow, have undergone a series of transformations. In a great measure they have been abandoned, which is why successions of pioneer species, with low ecological and economic value, have been triggered on these surfaces. As a result, the utility of these silvo-pastoral systems has been reduced considerably, in some cases their introduction into the forest fund being opportune or even necessary. The current legislation regulates the possibility of introducing into the forest fund some areas occupied by forest vegetation in compliance with some functional and administrative conditions - the consistency index > 0.4, the necessity to prepare a forestry management plan, the observance of the forestry regime, etc. The works necessary for the introduction of the silvo-pastoral systems into the forest fund involve a series of specific activities, namely precise delimitation and spatial positioning of the related areas, their mapping and evaluation, the establishing of the complexity of necessary silvotechnical interventions and, last but not least, the ensuring of their ecosystem stability. As a consequence, these works will be executed in stages, depending on the complexity of the conditions characteristic to these activities.

Key words: *forest fund, forest vegetation, silvopastoral systems, silvotechnical interventions, succession of pioneer species.*

INTRODUCTION

The agroforestry and silvopastoral systems represent complex land exploitation systems that are suitable simultaneously for agricultural crops, horticultural crops, forest crops and, respectively, for raising animals (Nair, 1993).

As a result, these complex systems of vegetable crops (Crainic & Stamate, 2009) and animal production, present a series of peculiarities, depending on the geographical area on the world map, thus highlighting a series of such systems, for the specific conditions of all continents (Cubbage et al., 2012).

The silvo-pastoral systems represent complex opportunities for diversified exploitation of the productive potential of the land, respectively the cultivation of trees from forest species of national and local interest, and the raising of animals. Although the agroforestry, agrosilvopastoral and silvo-pastoral systems present a series of advantages, after 1989, in many areas in Romania, their maintenance and promotion were unjustifiably abandoned. As a result, a series of such land exploitation systems were abandoned, unjustifiably, by the owners, and currently, for their optimal exploitation, a series of mapping works are needed (Bodog & Crainic, 2016) and maintenance (Crainic, 2017), correlated with the specifics of the land exploitation system.

This category also includes a series of partially wooded pastures (pastures on which biogroups with forest vegetation are installed), which were used especially for raising animals, and from the biogroups of trees, the wood had various uses for the proprietary communities from the area.

In the last three decades, the interest in raising animals in individual households has considerably reduced, and silvopastoral holdings have largely degraded, as a result, successive processes related to forest vegetation (successions between pioneer and fundamental forest species) have been highlighted on the respective surfaces.

In Romania, the area of the forest fund related to the number of inhabitants (population) is

0.27 ha and is below the European average (Florescu & Nicolescu, 1996; Nicolescu, 2009). In this context, for a series of lands, which are not used in accordance with the category of use, in the case of pastures undergoing afforestation, the necessary steps are taken to introduce them into the forest fund, private or state property, depending on the situation.

In the last two decades, in Romania, the area of land that has been forested has increased significanthly (Abrudan et al., 2003; Willoughby et al., 2008). As a result, a series of degraded and/or unsuited lands for agriculture were included in the national forest fund (Abrudan et al., 2003).

A particular situation is the introduction into the forestry fund of the Dobreşti Territorial Administrative Unit (municipality), administered by the Codrii Cămării Forestry of the Autonomous Management (A.M.) of an area of 7.60 ha, which comes from a silvopastoral system, respectively a wooded pasture.

The necessary administrative acts (documents) were drawn up for this area, to be included in the forest fund, and respectively for the change of the use category.

The introduction of this area of 7.60 ha into the forest fund requires a mapping, an analysis and an elaborate study, regarding the situation on the ground (the actual state) of it, in order to be able to establish on a scientific basis the complex of necessary measures, which they will impose.

For the various works specific to the forestry sector, technical norms are currently being developed, depending on their specificity. In the case of lands with a different category of use than forestry, namely wooded pastures (degraded silvopastoral systems), a series of works to introduce them into the forest fund, present different particularities, mostly transitory. As a result, the design, implementation and completion of these specific - transitory works must be carried out professionally, in some situations requiring particular solutions, based on local experience.

Currently, on a European level, a series of studies have been carried out regarding the forest management model, which would satisfy the requirements of the current society regarding forest products and services (Duncker et al., 2012). In this context, several models of forest management have been proposed, which satisfy certain requirements, very clearly established, depending on the geographical area and, respectively, the silvoproductive potential of the habitat.

Consequently, the process of introducing into the forest fund some areas from similar use categories (areas related to agroforestry, silvopastoral, agrosilvopastoral systems), must include a series of legal, technical and economic aspects.

Currently, in Romania, as part of the National Recovery and Resilience Program (P.N.R.R.), on December 12, 2022, the Guide to financing afforestation through the P.N.R.R. was launched, thus creating legal and technical codes, for the introduction into the forest fund, of lands that are not suitable for agriculture, or that have been abandoned and on which complex systems of exploitation, with specific agroforestry or silvopastoral, functioned in the past.

As a result, by introducing into the forest fund some areas on which complex exploitation, agroforestry and/or silvopastoral systems have been organized, the importance of these complex land exploitation systems is not diminished, but the introduction into the productive system within the forestry sector is aimed at, of these areas, which are not suitable for high-performance agriculture, with all the advantages that arise from this complex process (carbon storage, environmental protection, increase in the area of the forest fund, etc.).

MATERIALS AND METHODS

The present study was carried out on an area of 7.60 ha, from the property of the Territorial Administrative Unit (T.A.U.) Dobreşti, Bihor County (Figures 1 and 2), which was included in the forest fund administered by the private Forest District of Codrii Cămării Autonomous Management (A.M.). This surface was used as wooded pasture, and was introduced into the forest fund, based on a land exchange, carried out by National Agency Romanian Watershed Crişuri Oradea with T.A.U. Dobreşti, in compliance with the legislation in force.

The research and studies started in the spring of 2013 and continue partially even today.

As research methods were used: bibliographic documentation, analysis and study of the forest management and forest map in the areas adjacent to the location, analysis of acts, documents and records within the forestry unit that will manage the respective area, observation on the itinerary, stationary observation, experiment, comparison, simulation, spatial positioning, mapping, digital recording of representative images.

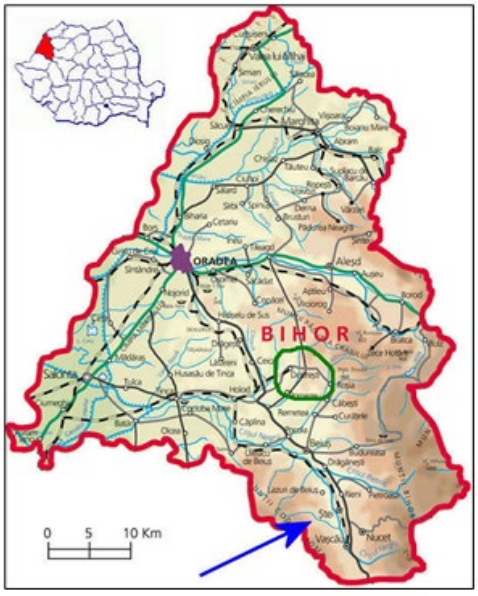

Figure 1. General location of the study
(https://pe-harta.ro/bihor/)

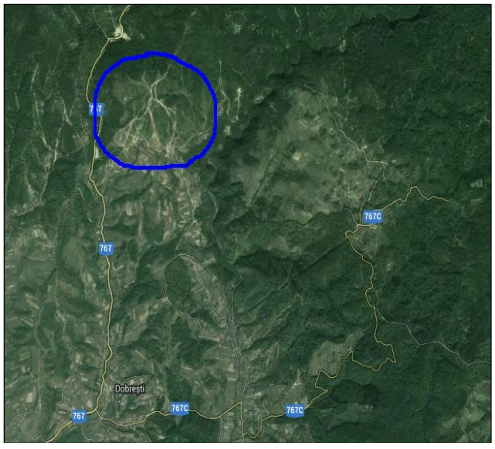

Figure 2. Location of the studied area
(https://maps.google.ro/maps?hl=ro)

To establish the type of forest resort, the type of soil, the type of indicator flora and respectively the type of forest, maps were carried out on the ground and a comparative analysis was carried out, taking as a reference the forest ecosystems in the immediate vicinity, which are even adjacent to the analyzed and studied surface.

The positioning of the characteristic contour points of the surface that will be the subject of the introduction into the forest background and the respective case study, the GPS system was used, within the G.N.S.S. technology, using dual frequency receivers, model TRIMBLE R10 (Crainic, 2011; Pica et al., 2022) (Figure 3).

Figure 3. Positioning of details with the GPS system through the RTK method

The working method used was R.T.K. - respectively kinematic positioning in real time, with obtaining the coordinates of the points positioned on the ground, in real time. The Trimble Controller program was used to collect field data and process it (Crainic, 2011).

The MapSys 10 program was used to report the coordinates of the contour points. The orthophoto plan of the work area was also used, for appropriate information regarding the spatial position of the studied surface (Crainic, 2011).

The work of mobilizing the soil, making the terraces, and digging the pits in which the saplings with bare roots were planted, was done with the mountain hoe (Figure 4).

Figure 4. The mountain hoe used for mobilizing the soil and building the terraces (original photo)

Chainsaws, power tools and tools were used to carry out the land preparation works, depending on their specifics. The woody vegetation was removed using the "STIHL" MS 180 mechanical chainsaw, and the Stihl F.S. 310, and Strauss motor tool (Figure 5).

Figure 5. The cutter Straus

The sequence of works was staggered by vegetation seasons, depending on the state of the forest crops and the biogroups of the pre-existing usable seedbed, respectively on their rate of growth and staged development.

RESULTS AND DISCUSSIONS

The area of 7.60 ha that will be included in the forest fund, and is the subject of this case study, was positioned with the GPS system, and the coordinates of its characteristic contour points, which were determined in real time, were reported in the plan with the MapSys 10 program and superimposed on the orthophoto plane related to the respective area (Figure 6).

Figure 6. Spatial location of the study area

Also, a series of biogroups with usable pre-existing seed from the *Quercus cerris* species, which will be included in the future arboretum, were positioned, and mapped (Figure 7).

Figure 7. Biogroups with specimens of the *Quercus cerris* species, which were integrated in the artificial regeneration, in the plot that will be introduced into the forest fund

The research, studies and analyzes carried out in the plot of the silvopastoral system, with an area of 7.60 ha, which was included in the forest fund, led to the obtaining of some results regarding the soil, habitat, and vegetation, which are presented below.

The identified soil type is luvic brown, with the code 240, which occurs on substrates poor in calcium and ferromagnesian minerals, respectively on clays, silicic shales, quartzites, mica shales, alternations of sandstones with clays, on gently sloping slopes or plateaus. The acidity varies between 5.3-5.8. It is intensely humiferous on the surface, with a humus content of 11.3-4.5% per 10 cm thickness. It shows the degree of saturation in bases of 59% in the El horizon and 72-76% in Ao and Bt is a mesobasic soil.

The creditworthiness is superior for beech, oak and hornbeam - on a soil with a large edaphic volume and shaded slopes, and medium in the other cases.

The type of resort that was identified in the area where the studied area is located is 5132 - Hilly of oaks Bm, medium edaphic luvosol, with mesophytic flora with grasses +/- *Luzula*. The relief is represented by a moderately undulating slope, with South-West exposure, sunny.

The identified forest type is 5131 - Coastal oaks with *Graminee* and *Luzula luzuloides*, of medium productivity (m), on the border with forest type 7112- Hill oaks (with *Quercus cerris*) of medium productivity (m).

Because the studied location is positioned in the phytoclimatic floor corresponding to the stands that have in their composition the species *Quercus cerris* L., *Quercus petraea* (Matt), Liebl., *Fagus sylvatica* L., *Fraxinus excelsior* L., *Acer pseudoplatanus* L., *Prunus avium* L., in the forest culture that will be installed on the surface of 7.60 ha, which is introduced into the forest fund, the future arboretum will have these species in its composition.

As a result, the afforestation formula, which was used for the installation of forest vegetation on the studied and analyzed surface, in accordance with the type of soil, the type of forest, the type of habitat and the technical norms in force, is the following: 60%*Quercus petraea* + 20%*Fagus sylvatica* + *20Acer pseudoplatanus/Fraxinus excelsior/Prunus avium.*

Also, the use of forest vegetation that has settled naturally, in biogroups, belonging to the species *Quercus cerris*, *Quercus petraea*, *Fagus sylvatica*, and various mixed deciduous species, characteristic of the respective habitat, will be considered.

The works required for the introduction of a plot of 7.60 ha into the forest fund, from a silvopastoral system, are similar to a series of silvotechnical works, but the working conditions are specific to agroforestry and/or silvopastoral systems. As a result, these works must be established, designed, executed and received rigorously, in order to obtain very good results, with minimal expenses.

After the spatial positioning and respectively the mapping of the surface that will be introduced into the forest fund, the works were established and carried out, staged, depending on the dynamics of the installation process, growth and development of the artificial and natural regeneration (where it is installed).

The proposed and executed works are represented by:

-cleaning the land of grassy and woody species;

-manual cutting of bushes, shrubs and thin trees without removing the root;

-the mobilization and preparation of the soil in order to establish the forest vegetation;

-the installation of forest vegetation, through plantations, in previously prepared land;

-completion of artificial regeneration through plantations;

-removing the overwhelming grassy vegetation from and between the rows of saplings, mechanized, with a power tool, using the disc as an active organ;

-removal of the overwhelming grassy vegetation on and between the rows of saplings, mechanized, with a power tool, using mechanical shears as the active organ.

These works are presented in detail, with the specific peculiarities of the time and production norms, related to the forestry sector (Table 1).

To prepare the land to mobilize the soil and install forest vegetation, the land was cleared of grassy and woody species, by mechanized cutting of bushes, shrubs and thin trees without removing the roots. As a result, light power saws, disc power tools and power shears were used.

To avoid the reduction of the area to be introduced into the forest fund, the plant material that resulted from the soil preparation works was removed from this area, and later it was used differently. After the removal of the grassy and woody plant remains, the mobilization of the soil became relatively easy.

The mobilization and preparation of the soil for the installation of forest vegetation was done manually, with a mountain hoe, in continuous strips, having a width of approximately 70-80 (100) cm and a depth of 10-15 cm respectively.

For a good location on the field of the prepared and mobilized bands, they are materialized on the field, by stretching some strings between the stakes (stakes) which are placed on alignments of approx. 50 m.

The mobilized strips were oriented on the level curves, to prevent water runoff from precipitation along the line with the highest slope (Figure 8). In 2013, an area of 4.00 ha was mobilized, and in 2014, the difference in surface area of 3.60 ha.

Table 1. Evidence of the works carried out in 2013, for the introduction into the forest fund, of the parcel analyzed and studied related to the silvopastoral system

Work done				
Code (standard symbol)	The specifics of the work	Unit	Time norm N.T..	Production standard N.P.
C.1.III.B	Cleaning the land of grassy and woody species;	100 square meters	0.68	11.83
C.4.A.b	Manual cutting of bushes, shrubs and thin trees without removing roots;	100 square meters	2.63	3.04
C.18.A.I.a.2	Prepared land in simple terraces 70-80 cm wide, with skeleton content below 25% (50-60 cm)	meter of terrace	0.17	46.39
C.18.A.I.b	Prepared land in simple terraces with a width of 70-80 cm, with a skeleton content of 25-50% (50-60 cm)	meter of terrace	0.26	30.20
C.24.I.b.1	Ditch storage of three-year-old deciduous saplings;	1000 pieces	0.21	38.84
C.28.I.A.b	Planted seedlings in prepared soil in pits of 30x30x30 cm in medium conditions - grouped norm;	1000 pieces	45.55	0.176
C.58.I.b	The discovery of forest species of herbaceous and woody species	100 square meters	1.16	6.90

Figure 8. Orientation of the mobilized bands on the level curves

The forest vegetation installation works on the studied surface were carried out by planting forest saplings with bare roots, started in the spring of 2013, and were staggered over a period of five years. In the spring of 2013, integral plantations were carried out on an area of 4.0 ha, and in the spring of 2014, the area difference of 3.6 ha was completed with integral afforestation works (Tabel 2). Also, from the spring of 2014 until 2017, works were carried out to supplement the forest vegetation, through plantations, on the surfaces where the artificial regeneration was not carried out (installed) in optimal conditions.

The seedlings were planted in previously prepared land, in pits of 30 x 30 x 30 cm, in a rectangular device, using 5,000 seedlings per hectare at 1.0 m per row and respectively at 2.0 m between rows (Figure 9). The working conditions were average, and for the economic evaluation of the work done, the use of the grouped norm was considered.

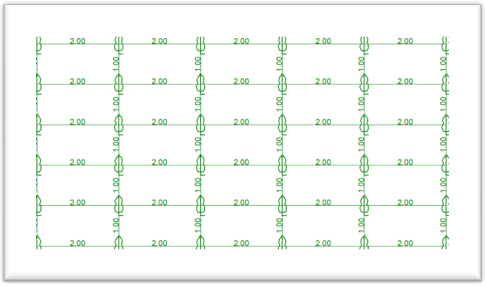

Figure 9. Placement of the saplings that will be planted in a regular device - the shape of a rectangle

Fagus sylvatica saplings were procured from the Codrii Cămării Forestry District A.M. the village of Dobreşti, from a tree registered as a source of seeds, following the agreement of the

Territorial Inspectorate of Forestry and Hunting (I.T.R.S.V.) Oradea, based on the regulations in force. The saplings from the other species were purchased against cost, based on official offers, from authorized nurseries, which had available the necessary biological regeneration material.

Table 2. Record of the surfaces on which integral afforestation works and additions were carried out, for the introduction into the forest fund, of the analyzed and studied parcel related to the silvopastoral system

Year	Surface (ha)		
	with integral afforestation works (I)	with aditions to afforestation works (C)	total with afforestation works
2013	4.0	0.0	4.0
2014	3.6	0.8	4.4
2015	0.0	1.5	1.5
2016	0.0	0.9	0.9
2017	0.0	0.4	0.4
Total	7.6	3.6	11.2

In 2013, 12,000 seedlings of the *Quercus petraea* species, 4,000 of the *Fagus sylvatica* species (Figure 10), 2,000 of the *Prunus avium* species (Figure 11) and 2,000 of the *Fraxinus excelsior* species were planted (Table 3). In total, in 2013, a number of 20,000 saplings on an area of 4.00 ha were planted in the form of biogroups of approximately 25 - 50 specimens of the same species.

In 2014, saplings were planted on the surface difference of approx. 3.6 ha. As a result, a number of 11,000 saplings of the *Quercus petraea* species, 3,000 saplings of the *Acer pseudoplatanus* species, and 4,000 saplings of the *Fagus sylvatica* species were planted.

On the area planted in 2013, part of the planted saplings was displaced (pulled out) by the *Sus scrofa attila* L. species, and it was necessary to complete the artificial regeneration. As a result, a number of 4,000 *Quercus petraea* saplings were planted. In total, in 2014, a number of 22,000 saplings were planted on an area of 4.40 ha.

In 2015, works were carried out to complete the artificial and natural regeneration, on an area of 1.50 ha. Thus, a number of 5,000 saplings of the *Quercus petraea* species were planted, and respectively 2,500 saplings of the *Acer pseudoplatanus* species. In total, in 2015, a number of 7,500 saplings were planted on an area of 1.50 ha.

In 2016, works were carried out to complete the artificial and natural regeneration, on an area of 0.90 ha. A number of 3,000 seedlings of the *Quercus petraea* species, 0,500 seedlings of the *Fraxinus excelsior* species, 0,500 seedlings of the *Acer pseudoplatanus* species, and 0,500 seedlings of the *Larix decidua* Mill species were planted. The species *Larix decidua* was introduced (planted) in the upper part of the slope - where the wind frequently blows, with the main objective of strengthening the ecosystem stability of the future stand, under the action of the dominant wind. In total, in 2016, a number of 4,500 saplings were planted on an area of 0.90 ha.

In 2017, works were carried out to complete the artificial and natural regeneration, on an area of 0.40 ha. A number of 1,000 *Quercus petraea* saplings and 1,000 *Quercus rubra* saplings were planted. In total, in 2017, a number of 2,000 saplings were planted on an area of 0.40 ha.

The surfaces on which there are biogroups with natural regeneration, from the species *Quercus cerris*, *Fagus sylvatica*, *Prunus avium*, *Fraxinus excelsior*, *Acer pseudoplatanus*, *Malus sylvestris*, *Pirus piraster*, etc., have been integrated into the artificial regeneration currently being installed, and which will form the future arboretum.

The total number of saplings, which were planted between 2013 and 2017, in the plot that will be included in the forest fund, is 56,000, on an efectiv total area of 1120 ha, seven species being used (Tables 3 and 4).

Table 3. Records of saplings by species and years, which were planted, for the introduction into the forest fund, of the analyzed and studied parcel related to the silvopastoral system

Year	Species (thousands of pieces)							Total (thousands of pieces)
	Quercus petraea	*Fagus sylvatica*	*Prunus avium*	*Fraxinus excelsior*	*Acer pseudoplatanus*	*Quercus rubra*	*Larix decidua*	
2013	12.0	4.0	2.0	2.0	-	-	-	20.0
2014	15.0	4.0	-	-	3.0	-	-	22.0
2015	5.0	-	-	-	2.5	-	-	7.5
2016	3.0	-	-	0.5	0.5	-	0.5	4.5
2017	1.0	-	-	-	-	1.0	-	2.0
Total	36.0	8.0	2.0	2.5	6.0	1.0	0.5	56.0

Table 4. Evidence of saplings by species, specific to afforestation works and years, which were planted, for the introduction into the forest fund, of the analyzed and studied parcel related to the silvopastoral system

Year	Planted seedlings of the species (thousands of pieces)														Total seedlings planted (thousands of pieces)
	Quercus petraea		*Fagus sylvatica*		*Prunus avium*		*Fraxinus excelsior*		*Acer pseudoplatanus*		*Quercus rubra*		*Larix decidua*		
	Saplings planted, specific to afforestation works, Integral afforestation, C-completions (thousands of pieces)														
	I	C	I	C	I	C	I	C	I	C	I	C	I	C	
2013	12	-	4	-	2	-	2	-	-	-	-	0	0	0	20
2014	11	4	4	-	-	-	-	-	3	-	-	0	0	0	22
2015	-	5	-	-	-	-	-	-	-	2,5	-	0	0	0	7,5
2016	-	3	-	-	-	-	-	0,5	-	0,5	-	0	0	0,5	4,5
2017	-	1	-	-	-	-	-	-	-	-	-	1	0	0	2
Total	23	13	8		2	-	2	0,5	3	3	0	1	0	0,5	56

Figure 10. Specimen (seedlings) of the *Fagus sylvatica* species, planted in the spring of 2013

Figure 11. *Prunus avium* specimen, planted in the spring of 2013

The percentage distribution of saplings planted, by species, for introduction into the forest fund, of the analyzed and studied parcel related to the silvopastoral system, is shown in the Figure 12. From the analysis of the data in the diagram presented in Figure 12, the *Quercus petraea* species has the highest share, over 60%.

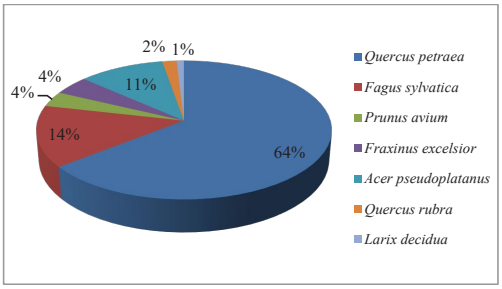

Figure 12. The percentage distribution of saplings planted, by species, for introduction into the forest fund, of the analyzed and studied parcel related to the silvopastoral system

The regeneration maintenance works installed in the plot are presented below.

An opportune work to be carried out within the experimental device is represented by the removal of overwhelming woody and grassy vegetation, respectively the uncovering of the seedbed.

This intervention aims to protect the seed immediately after its installation, against weeds that endanger its existence or that can prevent its development.

The work is carried out only on the portions on which there is a danger of overwhelming the seed, establishing the effective surface through observations and the placement of test squares.

The removal of the overwhelming vegetation will be carried out once or twice a year, the first intervention being done one month after the

beginning of the vegetation season - that is, the end of May, the beginning of June, so that the saplings can be fortified before the arrival of the hot season.
The second clearing is carried out at the end of September - the beginning of October, only if there is a danger that the grasses, weeds, shrubs, shoots due to their height and density will cause the saplings to lie down under the impact of snow. The vegetable mass resulting from the clearing is stored so that it does not disturb the installed seed.
In the present case study, the overwhelming grassy vegetation is represented by the fern *Dryopteris filix-mas* (L.) Schott, which shows a very active vigor of growth and development, in some places even luxuriant. Also, the mulberry species - *Rubus fruticosus* L., is present on some surfaces, overwhelming the biogroups with artificial and natural regeneration.
Considering the particularities of the season and of the grassy and woody vegetation related to the studied site, the following intervention options were proposed:
-removing the overwhelming vegetation from and between the rows of saplings with a motor tool, using the disc as an active organ (Figure 13);
-removing the overwhelming vegetation from and between the rows of saplings with the power tool, using the mechanical scissors as the active organ (Figure 14).
On the reception of the completed works, the specificity, quality and quantity of the completed works were checked and respectively analyzed, in the plot that was included in the forest fund.

Figure 13. Removal of overgrown vegetation from planted seedling rows with a Strauss disc harrow

Figure 14. Biogroups with regeneration from the species *Fagus sylvatica*, overwhelmed by the species *Dryopteris filix-mas*

The reception of the soil preparation and mobilization works was carried out following the passage of the surface on which these works were carried out, thus verifying compliance with their characteristic elements (the way in which unwanted grassy, shrubby and woody vegetation was removed, the way of placing mobilized strips, their width and depth, the distance between them, the degree of soil fragmentation). Following the receptions, it was found that the works were carried out properly, in accordance with the technical rules in force, for the activities in the forestry sector, and as a result, these works were settled (paid) to the executor.
For the reception of the afforestation works and the completion of the regeneration, it is necessary to place some trial areas in this sense. In accordance with the Technical Norms for carrying out the annual control of regenerations, for the regenerations in the II stage (natural, mixed and artificial), a series of common aspects are considered with the activity of performing the reception of the forest vegetation installation works on the road natural, artificial and/or mixed.
For the area of 4.0 hectares, which was planted in 2013, 16 test areas of 200 sqm were placed, which represents 8% of the culture area under control (for areas under 5 ha), totaling 3,200 sqm, in accordance with the technical rules in force.
For the area of 3.60 hectares, which was planted in 2014, 13 test areas of 200 sqm were

placed (which represents 8% of the culture area under control, for areas under 5 ha), totaling 2600 sqm, in accordance with the technical rules in force.

The shape of these test areas is rectangular, with dimensions of 20 m x 10 m, and the practical location on the ground is made using an imaginary rectangular grid of rectangles, with the large side on the contour line. The establishment of this network is carried out in relation to the first control surface, which is fixed in a corner of the regenerated surface.

Since the control surfaces are permanently maintained in the initial location, until the massive state is achieved, it is necessary that they be materialized on the ground, through terminals. In the case of quadrangular surfaces, the terminal is located in a corner that remains the same for all control surfaces, the other corners materializing through stakes firmly driven into the ground.

The bollard is made of wood, having a thickness of 8-10 cm, and a length of 1.20 m - 1.50 m (of which 0.6 - 0.8 m is buried in the ground). For easy identification, the upper head of the bollard will be painted red over a length of 10-15 cm and will bear an order number that will correspond to the registration in the field book (Figure 15).

Figure 15. Sample area made for the reception of afforestation works, and respectively for the annual control of regenerations, stage II, on the area of 4.00 ha

The test areas, which were placed in the field at the end of the afforestation action, are used for the technical reception of the afforestation works, and will also be used as annual control areas, for the regenerations carried out by artificial and/or mixed means.

On the reception of the afforestation works and the completion of the regeneration, it was found that they were properly carried out, and the payment of their consideration to the executor was accepted.

The reception of the works to remove the overwhelming vegetation was carried out at the completion of the work, checking the entire surface that was covered with this work (Figures 16 and 17). After the completion of the reception, it was found that the works were carried out properly, and as a result the settlement of these works was ordered the executor.

Figure 16. Removal of the overwhelming vegetation near the specimens from *Quercus petraea* species, which were planted in the spring of 2013

Figure 17. Removal of the overwhelming vegetation near the specimens from *Quercus petraea* species, which were planted in the spring of 2014

Starting with 2018, the plot on which it was planted, and on which regeneration maintenance works were carried out, was included (included) in the forest management (management plan), being numbered number 60.
Also, based on the analysis of the data from the field, it was found that the mixed regeneration tends towards biological independence on at least 80% of the plot surface, and as a result, it is considered that the conditions for the achievement of the massif status are met. As a result, a series of care works specific to young stands were established and proposed, generically called care cuts or typical cultural operations.

CONCLUSIONS

The introduction of some land surfaces, belonging to the silvopastoral systems in the forest fund, presents a series of peculiarities, due to the specific seasonal (vegetation) conditions and the way of exploitation of these complex exploitation systems.
The preservation and introduction of biogroups with usable regeneration, installed on the surface of silvopastoral systems, in the future arboretum, ensures regeneration in an optimal period, and determines the outline of a diversified structure, which can contribute to the consolidation of its ecosystem stability.
The species used for the installation of a stand, on the surface that will be introduced into the forest fund, must correspond to the fundamental natural type of forest, which was identified in the bordering (neighboring) stands, to properly use the silvoproductive potential of the station (of the conditions of environment).
To carry out the works to complete the natural regeneration, the species that were used were available at the time of planting, thus ensuring, from a technical point of view, all the prerequisites for their complete success.
The use of the *Larix decidua* species, in the upper part of the slope, was justified by the fact that this species develops a deep rooting system, which confers an increased (increased) resistance to the action of the dominant, destabilizing winds.
To ensure a suitable protection of the arboretum that has been installed in plot 40, it is necessary to make a suitable fence of it, especially to avoid the negative impact produced by the fauna of hunting interest, represented by the species *Sus scrofa attila*, *Capreolus capreolus* and *Cervus elaphus*.

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