THE INFLUENCE OF SOIL TYPES IN THE AFFORESTATION FIELD OF U.P. III STEIERDORF FROM ANINA FOREST DEPARTMENT

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Abstract: *The purpose of this paper is to research how to install forest vegetation on dumps Anina area. As more distant goal, the aim is restored to the production of forest vegetation on degraded land installing the perimeters Anina. In this case, the land under study are the rocky land, slopes, boulders, salty crust, bogs, fens, borrow pits and tailings deposits, bare of vegetation, or occupied by a low vegetation. The main object of this study is the installation of forest vegetation on degraded land in UP III Steierdorf, the area affected by the excavation and storage of materials resulting from blasting, excavation, burning bituminous rocks and alluvial land covered with water transported around these deposits.*

Key words: *forest law, reforestation, non-wood forest products, sustainable forest management*

INTRODUCTION

The land can be degraded in several ways, but the most obvious and most spectacular land degradation occurs as a result of exploitation of mineral resources. The operating activities of mineral resources extracted from the soil or subsoil man a large amount of material in order to obtain products. Land degradation and pollution can come from other diverse industrial activities: extraction and processing of oil, wood, pulp and paper, chemical industry, energy, transport, etc. Also, land degradation occurs from natural causes (volcanoes, desertification, and erosion) due to farming (intensive grazing, salinization due to inadequate irrigation, etc.), due to community building or housing. Pollution and risk to human communities and natural ecosystems do not disappear, but continues after stopping conclusion and economic activities caused land degradation. Those lands remain sources of pollution and risk. Ignoring these risks has sometimes led to the recording of accidents or disasters, either ecological or directly on human communities.

In Germany, the afforestation of coal stockpiles, have good results on maple and red oak in coarse deposits, lime sulfur, the heaps of loose soil, mountain elm, hornbeam, maple, the best stationary conditions dumps, aspen and white poplar, and for their capacity to secure good on dumps soil wetter Salix caprea had meritorious behavior and Salix incana. To improve dumps recommended sowing grain, lupine. The German lignite dumps, good results were obtained by acacia plantations, leading to soil, as evidenced by the appearance in these species Sambucus.

In the Czech Republic, the dumps remaining after exploitation of lignite, the best results occurring 15 years after planting, they were given mountain elm, maple, maple field, and pure ash plantations on the most fertile land or mixed with white alder and alder, the shale. The compact clays, poor were created pure stands of alder.

In France, the waste limestone from the exploitation of bauxite was terraced. The terraces was strewn with fine bauxite (for sealing), and above this, a layer of 0,4-0,8m, and then were sown grass (gramineous and leguminous plants). After that, they did *Eleagnus* *angustifolia* (Russian olive) plantations on slopes (interspersed with various species of conifers, especially pine and deciduous dry terraces, where plantations were irrigated). The results were good, and after four years all plant species quite well.

In Poland, the heaps of ash from the combustion of lignite were used 18 species of trees and shrubs. The seedlings were installed by sowing in containers filled only with ashes, ashes mixed with compost or peat or fertilizers added. The best results were given, ash and white poplar Pennsylvania; after seven years, poplar reached 8.1 m high, 7.8 m tall acacia, alder, larch to 4.5 m high and 3.5 m tall red oak. The best was the scheme in bunches or groups.

In Romania, the current forest productivity is below the productive potential of forest stations. This discrepancy is largely due to low productivity forests, totaling 22% of the total forest area. Both forests abnormal consistency and the composition inadequate productive potential of the resort, require artificial interventions Recovery works and even ecological restoration. The destruction of topsoil has obvious immediate effects of production capacity. In areas with loose rocks and river network rain, intense transport of sediments can lead to a rapid clogging of smaller lakes. This happened in the Bâşcov accumulations and Arges River, which in the period 1972-1976 were clogged between 90% and 98%. Direct measures to combat land degradation processes are the work of installing a consistent vegetative cover on degraded lands, especially afforestation of degraded works; soil maintenance work (terraces, plowing the contours); earthworks water on slopes (grooves on the level curve, the ditches pits funnel val); the consolidation of unstable land (dry masonry benches); works to strengthen the network (silt fences, sills, dykes); drainage works in excess or descent of groundwater level (drain ditches and drains); work fixing mobile sands; works to avoid floods.

In stationary conditions particularly heavy textured surface soils such as clay or limestone cliffs in dry regions, massive closure is done very late, at the age of 15-20 years or over 20 years of age or never (on rocks with rare patches of soil or rock mass).

MATERIAL AND METHODS

The main objectives of this study are:

- Establishing research areas proposed for ecological restoration in UPIII Steierdorf, Forest Department Anina;
- Determining soil types in land improvement taken;
- Following up the use of these lands by changing the land unproductive forest crops for protection and production, to achieve fully the objective of changing the use of these lands;
- The establishment, location and marking research areas;
- The choice and combination forest species;
- Procurement of seedlings;
- Determine the main characteristics of seedlings planted biometrics;
- Physiological measurements forest species breeding installed on land taken;
- Monitoring the behavior of woody species placed at research.

The area of improvement that under study is located in the unincorporated town Anina around Steierdorf neighborhood. From the point of view of the forestry land is across the Forest Anina and belongs to the Forestry Department Resita. Degraded lands are part of UPIII Steierdorf and have a total area of 20 ha. The soil analyzes were performed in the laboratory of physic-chemical research at OSPA, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine of Banat.

The production unit is part of the group III Steierdorf southern Banat Mountains, located in Western Semenic - Almaj respectively Anina Mountains. The production unit comprising the upper basin of the valley Minis, which is the affluent of the Nera river. In terms of forest management plans, land taken under HG no. 75/2003, established perimeter Anina improvement after rules will systematize landscape planners and be included in the management plan Steierdorf production unit III, which, moreover, have been removed. The work began with detailed research on aspects of the natural geology, geomorphology, landforms, climatology, vegetation, soils and stationary complexes. The studied Anina Mountains is located in a natural unit specific relief Resita-Moldova Nouă. The landscape has developed a sedimentary layer, characterized by surface erosion and step consists in the lower third of ridges and narrow valleys with medium and short slopes, steep with altitudes between 629 m and 940 m. The bottom of the perimeter is a character Karst less pronounced peaks and consists of large, gentle relief with relatively little energy and is strewn with negative forms of relief such sinkholes, with openings not exceeding 20 m and depths of 3-4 m. The whole perimeter of the exhibition is generally in the SE part, with small variations of NV.

Anina improvement perimeter area of geological, mechanical engineering is situated on Carpathian Mountains field. The predominant geological formation belongs to Jurassic period, represented by formations of Oxfordian-Tithonia floors and inferior Jurassic.

Anina Mountains express a resultant climate complex interaction between solar radiation, the physical landscape and circulation of air masses in an area relatively close to the Adriatic Sea and located in the shelter of the Carpathian Mountains. These issues cause moderate continental climate temperature, the submediteranean climate nuances being evident. Climate peculiarities are strongly influenced by currents that form in the Mediterranean and entering the south west as warm and humid air masses. They induce increase in air temperature and rainfall causes (1039 mm/year Anina station), which notes two peaks: May, June and October. After Monograph Geographical RPR fall within the perimeter of improvement in the climate submediteranean, Banat land of hills and highlands.

The territory which is comprised of Anina is tributary area for improvement, in terms of hydrology, river Minis that it borders on the S-SV. Crivaia Downstream, the river has Minis permanent flow. The improving perimeter territory covers a small area, geological and climatic relatively uniform. The differences are highlighted in the biological factors, at the groundwater level, but especially the anthropic one. Natural elements characterized by a relatively mild thermal conditions, specific climate zone, rainfall and the existence of limestone and marls substrate determined specific pedogenetic processes with black humus accumulation profile and more deeply than even the calcareous skeleton surface. In areas with low tilt under forest on limestone or marl soils have developed brown soils with moderate accumulation of weak mull acid to form clay and remaining active on the spot or poor migration of colloids.

In the plains, whose surface is narrower (9.70 ha), soil pedogenesis under the influence level that is confined groundwater and are influenced by particle size and mineralogical composition of alluvial deposits. Human factor remains, however, what caused this item on 53.50 ha of protosols anthropogenic total skeletal deconstructed and powerful.

Fig. 1. *Pinus sylvestris* seedlings immediately after planting, the area of research S1 wooded with 6PIN2SL2PAM

In the studied area there are identified dumps and surrounding land areas of research have identified a cambice soil type and two subtypes, according to the Romanian System of Soil Taxonomy. In order to determine the types and subtypes of the soil and the establishment of the physical - chemical properties were carried out soil profiles, the descriptions were made and samples were taken for analysis.

The Cambice soils identified research areas around studied are:

Rezicalcaric brown soils - soil profile is of type Ao - AB -Bv -BRrz. Ao horizon is about 9 cm thick, dark brown silty loam texture, glomerular structure. Subhorizontal AB is about 21 cm thick, the percentage of humus is lower, and color becomes brown with dark brown areas caused by infiltration of Ao horizon humus, clay content increases and becomes glomerular polyhedral structure. Bv horizon is less developed (20cm) with clayish texture, small polyhedral structure. The contents of the frame profile varies from 0 to 30% horizons Ao, AB and BV at 60% BRrp horizon.

The soil reaction is acidic and moderately acid in the upper horizons in Bv and BRrz, eumezobazic (the degree of base saturation ranges from 55.98% to 77.15%). The soil is rich in humus middle relatively rich in nitrogen and phosphorus and potassium-rich medium.

Limiting factors can sometimes under-midfield edaphic volume, relatively high content of skeleton and clay that can interfere negatively in the supply of water during dry periods. The content of mineral and organic nutrient profile varies as follows: humus from 6.32 to 2.37%, total nitrogen from 0.362 to 0.150% phosphorus 8.49 to 2.48 mg / 100g soil assimilable potassium 11.24-7 45 mg / 100 g soil.

Typical brown soils - Shows the following sequence of horizons Profile: Ao-Bv-C. Ao horizon is 10-20 cm thick and yellowish brown is closed due to the accumulation of humus, stable grainy structure, loose, permeable and well penetrated by roots. The Bv horizon (cambic soils) has variable thickness (20-100cm) with brown to yellowish or reddish shade and a medium texture and a polyhedral structure is generally permeable. C horizon consists of surface deposits, from alteration of rocks rich in minerals calcium.

The brown soils present on undifferentiated texture profile. The structure is grainy in Ao and polyhedral in Bv, very stable. Due to the profile undifferentiated structure and good structure and other physical, physical-mechanical, hydro and aeration are favorable. Its Bv horizon (bill of exchange) with high base saturation ≥ 55%, with yellow color than 5yr at least at the top and chrome values ≥ 3.5 wet materials at least within structural elements. Soils brown soils are moderately inclined slopes meet. The humus content is less than 2% and mull type, the C / N 15. The reaction is moderately acidic (pH 5.8 to 6.5), and the degree of base saturation ≥ 55%. Soil is well supplied with nutrients and has a relatively good microbiological activity. It is very well supplied with total nitrogen (0.13 - 0.37 g%).

Improvement of degraded lands perimeter Anina span a relatively small area so that their contents can be found in many common elements GEOTOP. However, there are some important MicroStation elements involved in defining the stationary groups and types of resorts. Throughout the production unit III Steierdorf meet unaffected resorts degradation covered by forest hill and mountain beech forests specific. However, much of the area is strongly affected by degradation caused by human actions.

There are degraded lands depositions of materials that are distinguished by MicroStation slope, or physical characteristics of the material stored. Other actions were damaged by blasting or affected by subsidence, erosion surface or deep, clogging material transported from the dumps in the stream channels.

Fig. 2. The S2 wooded area of research with 6PIN2SL2PAM after gaps filling

In the general climate uniform, resorts creditworthiness is the presence and type of degradation in soil skeleton content, the slope, the presence of deep erosion, the existence of a material containing fine material stockpile, the permeability field. Stationary conditions were evaluated in view of existing trees and better management of degraded lands through afforestation, accompanied, where appropriate, work aids; on part of the land, due to the specific degradation resorts could not be assimilated to the forest fund.

On the field of the unit production III Steierdorf, we identified and separated five groups stationary after geomorphological characteristics, vegetation and erosion. Within the groups were differentiated types stationary states according to established technical solution to improve degraded land.

RESULTS AND DISCUSSIONS

The soil analyzes were conducted laboratory tests to Soil Science, Faculty of Agriculture at the University of Agricultural Sciences and Veterinary Medicine of Banat.

The soil samples were collected in order to grasp the influence of ecological factors on the UP III Steierdorf land. The investigation of soil units of UPIII Steierdorf, Caras-Severin, was on four main profiles. The soil conditions and morphological description of soil profiles was done according to the "Romanian System of Soil Taxonomy" (2008), supplemented with data from the Soil Survey Methodology Development - ICPA-1987.

Soil sampling was conducted on genetic horizons, the amended settlement and settlement unmodified (natural). For the characterization of physical, hydro and micro-morphological soil samples were collected in alignment unchanged. Sampling was done in metal cylinders with known volume in the soil temporary humidity and in cardboard boxes specially made for micro-morphological characterization. Also, unchanged were harvested in waxed cardboard boxes, sampled for microbiological and enzymatic activity. For physic-chemical, mineralogical and partly biological samples were collected in alignment changed. Sampling was done in bags on each genetic horizon. Preparation of samples for laboratory tests consisted of organic debris removal and inclusions, some traces of the skeleton, then milled and sieved were (with the exception of soil samples collected in natural alignment).

For physical determinations were used the following methods:

The particle size analysis. Depending on the amount of organic material that contained soil samples were harvested, and two methods were used for the pretreatment: In the samples with more than 5% organic matter, the organic matter was pre-oxidized with hydrogen peroxide 6% and dispersion of Kacinski a solution of 10% potassium hexametaphosphate or sodium hydroxide solution to the boil according to the method; samples with less than 5% organic matter, the dispersion is carried out only with the solution of 10% potassium hexametaphosphate.

Determination of particle size fractions was performed by pipetting method for fractions <0.002 mm, and including wet sieving method for fractions from 0.02 to 0.2 mm and dry sieving method for fractions> 0.2 mm. The results were expressed as a percentage of the remaining material after the pretreatment. The mineralogical composition of the clay fraction (<0,001mm) was made by X-ray diffraction evidence oriented saturated calcium glycolate. The mineralogical composition of the coarse fraction was determined using a polarizing microscope, the glass slide on which the sand grains are fixed by means of Canada balsam. The initial moisture content of the soil (Wi) of the soil sample by drying in an oven at a temperature of 1050C. Equivalent humidity (EU) by centrifuging a sample of ground with a force of 1,000 times the acceleration of gravity (which retain moisture soil sample centrifuge).

Chemical and biochemical characteristics:

The determination of humus components was made after the Kononov-Belcikova' method (1961):

- Extractable organic carbon (CET) by extraction with sodium pyrophosphate solution 0.1 N and 0.1 N sodium hydroxide;

- The total content of humic acids (CAHT) by extraction with 0.1 N solution of sodium pyrophosphate;

- The total content of fulvic acids (CAFT): the difference CAFT = CHP CAHT;

- Humic content (CH): the difference CH = Ct - CET (Ct = total organic carbon -%);

- Belonging organic carbon fraction of free humic acid (CAHi) by extraction with 0.1 N NaOH solutions;

- Humic acid organic content related to Ca (CAFn): the difference Cahn = CAHT - CAHi; amount CAHi + CAFn: 0.1N NaOH solution by extraction;

- Total Nitrogen (N): Kjeldahl method, the disintegration of H2SO4 at 350 ° C, the catalyst potassium and copper sulfate.

- Soil reaction (pH): potentiometer, the combined glass and calomel electrode in an aqueous suspension, the ratio of soil / water of 1 / 2.5.

- Exchangeable cations (SB me / 100 g soil) (Ca2 +, Mg2 +, K +, Na +) have been extracted by the method Schollenberger-Cernescu. Dosage Ca2 +, K +, Na + was performed by flame photometry, and the Mg 2+ by atomic absorption spectroscopy.

- The total acidity of exchange (H + exchangeable - SH me / 100 g soil) by leaching with potassium acetate (or sodium acetate) at pH 8.3.

- The acidity of exchange of the extract in non-buffered salt solution (Al +++ exchangeable) by leaching with 1N potassium chloride, following the method Colleman.

- The total cation exchange capacity (T - me / 100 g soil) by adding cations Ca2 +, Mg2 +, Na +, K + and H + exchange in total acidity, free of carbonates samples (T = SB + H). The carbon sample was obtained by saturating the soil with NH4, NH4 movement KCl solution absorbed and the dosage of ion NH4 titrimetrically to give Na + and K +, Schollemberger-Cernescu method. Ca2 + + Mg2 + = (Na + + K +). The exchangeable cations were not made corrections soluble values.

- The degree of base saturation (V%) by calculation based on the relationship: V% = SB / T x 100.

Table 1

Results' regarding the grip and growth percentage of seedlings on soil types resulting from analyzes

Soil analysis in the report U.P. III Steierdorf (S.R.T.S. 2012)

U.N., soil type and subtype (name) Code	The diagnostic Horizon	The diagnostic Horizon level cm	Humidity%	PH	Humus %	The exchange Hydrogen %	Total capacity of exchange me %	Saturation level in base %	Texture
4F Br.eumezobazic rezicalcharic-3104	Ao	0-15	1.194	5.850	7.026	18.692	6.184	54.876	0.360
	Bv	16-80	0.912	6.610	0.558	15.200	5.093	50.293	0.029
25D Br.eumezobazic rezicalcharic-3104	Ao	0-10	2.129	5.350	5.799	17.222	11.786	59.008	0.297
	Bv	11-80	2.096	5.120	0.669	8.880	12.368	51.248	0.034
5C Br.eumezobazic tipic-3104	Ao	0-10	1.149	5.200	8.643	10.820	12.877	53.697	0.443
	Bv	11-80	0.588	5.060	0.613	4.030	7.057	51.087	0.031
5G Br.eumezobazic tipic -3104	Ao	0-10	1.008	5.020	4.628	5.000	10.185	55.185	0.237
	Bv	11-90	0.830	5.030	1.059	6.940	9.094	56.034	0.054

CONCLUSIONS

It can be concluded that the apparent development of spruce is more influenced by soil moisture and its physical properties than the degree of base saturation parts, while the spruce seedlings surfaces were not properly developed.

It can be observed that soil moisture (2.129%) had a leading role in the state of vegetation lanced a high percentage *Picea abies* seedling; in such states it doesn't equalize performance *Pinus sylvestris* seedlings adaptive.

In terms of chemical properties of soil, spruce grows optimally at a high base saturation between 35-85% and a pH of 4.8 to 6.4. Although soil analyzes revealed a degree of base saturation between 50.293 to 59.008% and a pH of between 5.020 to 6.610, *Picea abies* seedlings did not have a large percentage of grip and no good growth rate.

Scots pine grows optimally at a high base saturation between 25-75% and a pH of 4.8 to 6.2 As shown in Table 4.9, the degree of base saturation and pH - within the limits of the literature, *Pinus sylvestris* seedlings had a good grip percent and a growth rate higher than that of *Picea abies* seedlings.

In order to develop acacia, in addition to the heat and moisture conditions are relevant physical and chemical characteristics of the soil. In terms of chemical properties of soil, acacia meets optimum growth and development to a degree of base saturation between 80-100% and a pH of 6.6 to 7.2, being negatively influenced by a degree base saturation of 70% and a pH of 6.2 to 6.4.

Although the soil analyzes showed a degree of base saturation from 50.293 to 59,008% and a pH of between 5.020 to 6.610, *Robinia pseudacacia* seedlings had a high percentage of grip and a good pace of growth.

The Sycamore active vegetate shallow soils rich in base parts and well stocked with water, as in the mountainous lands (where included research area Steierdorf UP III). In terms of chemical properties of soil, *Acer pseudoplatanus* develop optimal degree of base saturation between 55-95% and a pH of 5.8 to 7.0.

Soil analyzes indicated a degree of base saturation between 50.293 to 59.008% and a pH of between 5.020 to 6.610, *Acer pseudoplatanus* seedlings had a high percentage of grip and a good pace of growth.

BIBLIOGRAPHY

1. CIOLAC RAMONA, CSOSZ I., MARTIN SIMONA, MARIN DIANA, DINCU ANA MARIA, ILIE ALINA, BOGDAN NICOLETA, 2012, Development areas of rural tourism in Romania, Lucrări Ştiinţifice Zootehnie şi Biotehnologii, ISSN 1221-5287, vol.45 (1), 2012, pag. 435-439;
2. CRĂCIUNESCU A., MOATĂR MIHAELA, STANCIU S., 2014, Considerations regarding the afforestation fields, Journal of Horticulture, Forestry and Biotechnology, ISSN 2066-1797, Volume 18 (1), 2014, pag. 108-111;
3. CRĂCIUNESCU A., MOATĂR MIHAELA, STANCIU S., 2014, Comparative study in Romania and European states regarding the management afforestation lands, Lucrări ştiinţifice Management Agricol, ISSN 1453-1410, Seria 1, vol. XVI (4), 2014, pag. 83-88;
4. CUREC, C., MARTIN, S., TABĂRĂ, V.: Food, feed and green energy: premise for the sustainable agriculture toward transnational network of rural solidarity, XXXIII Conferenza scientifica annuale AISRe, Roma, Instituzioni, Reti Territoriali e Sistema Paese: La governance delle relazioni locali-nazionali, Italy, pp 22-32, 2012.
5. KAREL LATO., 2012, Pedologie forestieră. Editura Eurobit, Timişoara;
6. MIHAELA MOATĂR, LĂZUREANU AUREL, 2010, Research on the production arrangement applied Steierdorf Unit III, Journal of Horticulture, Forestry and Biotechnology, Vol XIV (3), pag. 164-167;
7. MIHAELA MOATĂR, LĂZUREANU AUREL, 2010, Research on the measurements used in the test areas located in production Steierdorf III, Journal of Horticulture, Forestry and Biotechnology, Vol XIV (3), pag. 168-171;
8. ORBOI MANUELA-DORA, 2013, Aspects regarding the state of tourist infrastructure in the West Region and Timis County in Romania, Lucrari Stiintifice Management Agricol, ISSN 1453-1410, Vol. XV (4), pag. 293-301;
9. ORBOI MANUELA-DORA, BĂNEŞ A., PAUNCHICI IASMINA, 2008, Aspects regarding the standards and regulations for the organic production, Lucrări Ştiinţifice Facultatea de Agricultură, USAMVB, vol. 40, pag. 273-276;
10. STANCIU S., TABĂRĂ AMÂNAR C., Integrating Environment into Agriculture and Forestry, Lucrări ştiinţifice, vol. 51, Seria Agronomie, Lucrare S4_PL_45 (CD);
11. STANCIU S., TABĂRĂ AMÂNAR C., 2011, Comparative analysis of the offenses covered by forest legislation in Romania, Journal of Horticulture, Forestry and Biotechnology, vol. 15(1), 203-208;