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RESEARCH CONCERNING THE ORGANIC CARBON QUANTITY OF NATIONAL PARK PIATRA CRAIULUI AND THE C/N RATIO

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Abstract

In our country we have 25 National and Natural Parks of 552,174.80 ha area. Piatra Craiului National Park has a surface of 14,800 ha. The total protected areas surface has 1,234,710 hectares, representing 5.18% of the country. We have analysed, in this paper, 10 profiles of 31 horizons, the soil samples being collected from the National Park Piatra Craiului. The following parameters were analyzed: pH, organic C, total N. The pH was electrochemically determined in calcium chloride, and the carbon and the nitrogen have been analysed by the dry Dumars combustion method. The results have shown that the mountain forest soils are strongly acidic, with a pH between 2.5–5 in saline extract, except the 5 horizons with a pH between 6.2-7.2. The soils are richest in organic carbon and nitrogen. Regarding the C/N ratio values, their correlation with altitude showed a degree of normal fertility.

Keywords*: C/N ratio, forest soil, organic carbon, nitrogen.*

INTRODUCTION

Climate change is one of the most important phenomena facing mankind at the present time and viable solution to these is represented by carbon dioxide retention in forest vegetation. Quantification of carbon captured in the forest ecosystems has become an important issue since the entry into force of the Kyoto Protocol, and to increase the amount of carbon stored in these ecosystems, have an important role for afforestation.

As a result of climate change, increasing atmospheric CO_2 concentration has the ability to alter the chemical composition of litter, may influence the cycle decomposition and C/N in forest ecosystems. Studies on C and N content in the first centimeters of the soil profile showed less effect of tree type [9]. Influence of trees on soil nutrient content is detected first in the litter, while the mineral soil differences are found later [11].

The main pools are forest sequestration and other vegetation, which removes carbon dioxide through photosynthesis. Forestry is an important repository for carbon, as well as agriculture [8].

Another important parameter is the soil total nitrogen. Recently the amount of soil nitrogen and C/N are used as indicators of soil carbon sequestration expression [1, 5]. Variability in the amount of nitrogen and C/N in the soil can be correlated with the type of stand [7].

Soil organic carbon is generally natural carbon that is contained in the matter live or dead, in various stages of processing. Organic carbon is the most important component because it is key to energy transformations in nature and directly influences all the qualitative properties of soil [8].

Estimates of organic carbon stored in forest soils have applications in studies of soil quality, carbon capture technologies and carbon trading. These estimates are used to establish long-term carbon flows to manage natural resources and to design strategies for carbon sequestration [2].

Forest soil in Europe store roughly 1.5 time more carbon than treea [5]. Inventory and analysis of soil organic carbon are required for soil quality assessments [10].

Globally, forests store large amounts of carbon sequestered from the atmosphere and retained in living and dead biomass and soil [12].Most (2/3) of terrestrial carbon is found in the surface soil (soil and roots) estimated 1,500 Gt of C organic world, a much more protected from decomposition. C below the

reserve forest land, permanent pasture and other permanent ecosystem (mountain areas) remains nearly intact ecosystem does not suffer as long as changes. In our country there are 25 national parks and natural area of 552,174.80 ha. Piatra Craiului National Park has a surface of 14,800 ha. The total area of protected areas is 1,234,710 hectares, representing 5.18% of the area of the country

MATERIAL AND METHOD

Research has been conducted in 10 research areas namely: Valea Podurilor, Coltii Chiilor, Magura, Casa Folea, Predelut, Curmatura, La Table, Coltii Ghimbav, Brusturet, Valea lui Ivan, research areas are located in National Park. The soil samples were harvest of the 10 research points with 3 repeated for each point, the following standard depth 0-10 cm, 10-20 cm, 20-40 cm, > 40 cm. The methodology for soil sampling is: the soil samples were gathered on genetic horizons, after digging the soil pits. For each horizon, 1 kg of soil was gathered. Two samples from different depths were gathered for the horizons that are larger than 20 cm. Preparation of soil samples is based on the ISO 11464 method [6].

Collected samples should be transported to the laboratory as soon as possible and be air dried or dried at a temperature of 40 °C. They can then be stored until analysis [3].

All analyzes were performed according to the manual on Manual on methods and criteria for harmonized sampling, assessment, monitoring and analysis of air pollution on forests – Sampling and Analysis of Soil [13]. pH was determined electrochemically in calcium chloride, readings being made with a Thermo Orion3 pH meter; Carbonates were determinants with calcimeter Scheibler.

Organic carbon is analyzed by dry combustion method Dumars, using Tru Spec CN analyzer (LECO type).

Total soil nitrogen was determined by wet digestion method and dosage titration - Kjeldahl method ammonia is distilled into boric acid and excess catch titrated with sodium hydroxide solution. The equipment used consists of mineralized and distiller type Gerhardt.

RESULTS AND DISCUSSIONS

In the 10 areas of Piatra Craiului National Park from which rose and soil samples were used to determine and calculate the C/N.

The results indicated that mountain forest soils are strongly acidic, with pH between 2.5 - 5 in the saline extract, except for five horizons with a pH between 6.5 and 7.2.

In the first horizon of mineral soil profile, the organic carbon stored quantity is increased due to the litter rich and gross in lignin. Since the profiles are located natural areas, without human activity. The soils are richest in organic carbon and nitrogen. Regarding the C/N ratio values, their correlation with altitude showed a degree of normal fertility.

C/N is included in class 9 surface normal fertility investigated on lypointtofit Magura low fertility class.

Table 1.The amount of Corg and total N in the soils analyzed

Location	Type soil	Horizont	Depthcm	Ct%	Nt%	C/N
Valea Podurilor	Districam bosol	Aou	0-10	14.01	1.173	11.95
		AB	10-20	8.61	0.363	
		Bs1	20-40	5.65	0.223	
		Bs2	>40	5.72	0.168	
Coltii Chiilor	Rendzina	Am	0-20	12.01	1.005	11.95
		AR	20-40	5.50	0.391	
Magura	Districam bosol	Aou	0-10	8.40	0.476	17.66
		AB	10-20	1.91	0.112	
		Bv1	20-40	0.70	0.056	
		Bv2	>40	0.37	0.028	
Casa Folea	endzina	Am	0-20	16.21	1.120	14.48
		A/Rm	20.40	5.60	0.419	
Predelut	Districam bosol	Ao	0-10	4.85	0.363	13.36
		Bv1	10-20	1.01	0.111	
		Bv2	20-40	0.47	0.055	
		Bv/R	>40	0.59	0.084	
Curmatur a	Districam bosol	Ao	0-10	12.60	0.806	15.63
		Bv	10-20	3.59	0.334	
		Bv/R	20-40	1.66	0.168	
La Table	Districam bosol	Ao	0-10	5.70	0.445	12.81
		Bv1	10-20	2.40	0.139	
		Bv2	20-40	1.06	0.084	
		Bv3	>40	0.59	0.028	
Coltii Ghimbav	Rendzina	Am	0-20	7.34	0.723	10.15
		A/Rm	20.40	5.28	0.500	
Brusturet	Rendzina	Am	0-20	6.62	0.582	11.37
		A/Rm	20.40	3.43	0.361	
Valea lui Ivan	Districam bosol	Ao	0-10	5.53	0.529	10.45
		Bv1	10-20	3.39	0.250	
		Bv2	20-40	1.48	0.140	

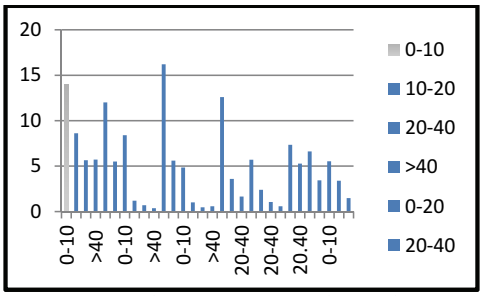

Fig.1. Evolution of organic carbon in deep

CONCLUSIONS

Even though the soil types of the 10 areas are not too large differences (districambosol andrendzina) in terms of soil nutrients are considerable differences, such as: Increased amount of organic C districambosol under a stand of coniferous (spruce fir) districambosol unlike under deciduous trees (beech and oak), due to abundant litter and lignin rich in the first case; Leaf carbon content has the highest values in surface Casa Folea, recorded here a correlation between the content of this element both in leaves and soil.

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