THE INFLUENCE OF A DOUGLAS CROP (PSEUDOTSUGA MENZIESII) COMPARED TO A FUNDAMENTAL NATURAL SESSILE OAK STAND (QUERCUS PETRAEA) CONCERNING ON THE TROPHICITY OF A STAGNIC LUVISOL

PetricăTudor Moţiu, N.C.Sabău, Ingrid Agnes Moţiu *

*University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea; Romania, e-mail:tudor_motiu@yahoo.com

Abstract

The main objective of this work is studying the evolution of some chemical properties of the proxihipostagnic luvisols under the long term influence of the forest vegetation, respective 40 year old Douglas forest (Pseudotsuga menziesii and 70 year old Sessile oak (Quercus petraea).

The folic unhydromorf O horizons, present on the surface of analyzed soil profiles, has under the Sessile oak a content of 37,02 % humus and 21,47 % of organic carbon while under Douglas 29,8 % and 16,87 %.

The different evolution of the chemical properties of proxihipostagnic luvisols is due to organic matter from folianeous horizons, more acid under Douglas and less acid under Sessile oak.

Key words: Douglas forest, proxihipostagnic luvisols, chemical properties, trophicity.

INTRODUCTION

The soil, the representative of pedosphere, the layer formed in time under the influence of pedogenetic factors, on the surface of lithosphere is interposing between this and the biosphere, hydrosphere and atmosphere. Among all these spheres of global environmental system are existing mutual influences. [4.]

In case of relations between the pedosphere and biosphere, the most important relation of interdependence is represented by the fact that the soil represents the natural support, assures water and nutritious elements necessary for growth and development of vegetation, while the biosphere, through the quantity and quality of organic matter distributed on the surface and depth of soil, influences the quantity, quality and distribution of humus in the profile's depth. [3.]

The objective of the presented work is to show the influence of forest vegetation, represented by 40 year old Douglas and 70 year old Sessile oak, on the chemical properties of a epihipostagnic luvisols from the area of Tinca Forest District, U.P. 3 Gepis. [5.]

The soil is laid on a relatively flat surface with little waves, with an altitude of 280 m, this is a reason why it presents stagnic properties, on the superior part of the profile.

The type of herbal flora, after Beldie and Chiriță, is: ***Genista tinctoria - Poa nemoralis*** and other guiding plants (frequent accompanying) are: Carex contigua, Dactylis glomerata, Galium pseudoaristatum, Lapsana communis, Melampyrum bihariense, Cytisus nigricans. [1.]

MATERIAL AND METHODS

In order to reach the proposed objective, on the epihipostagnic luvisols from U.P. 3 Gepis were opened two soil profiles, until the depth of 1 m, one in the 38 F parcel, occupied by 40 year old Douglas (Profile no.1) and the other one in the 38 B parcel, occupied by 70 year old Sessile oak (Profile no.2) on a distance of approximately 30 m between the profiles. (Figure no.1).

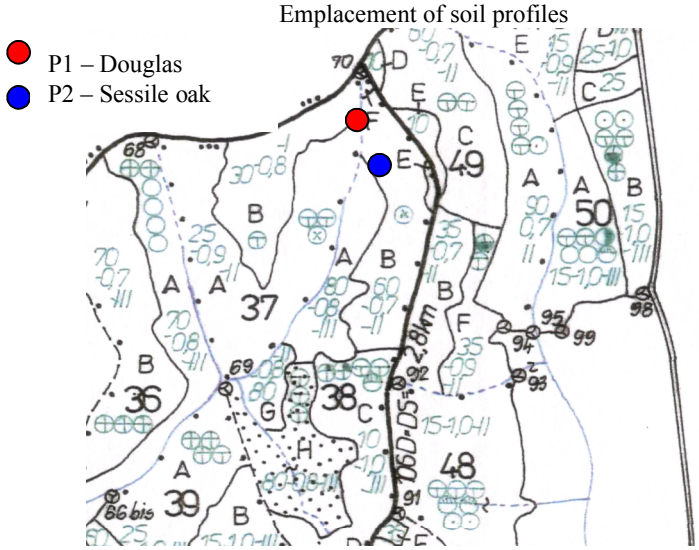


Fig. 1

After the delimitation of horizons there were crapped samples from each horizon inducing the following characteristics: texture, reaction (pH H_2O), hydrolytic acidity (Ah), the sum of bases (SB), saturation degree in bases (V %), humus (H %), total nitrogen (N %), phosphor (P p.p.m.) and mobile potassium (K p.p.m.).

In order to determine the characteristics of organic matter, for folic horizon (O) from the two profiles there had been induced: reaction (pH H_2O), humus (H %) and organic carbon (C org. %).

RESULTS AND DISCUSSION

Soil reaction variation with depth

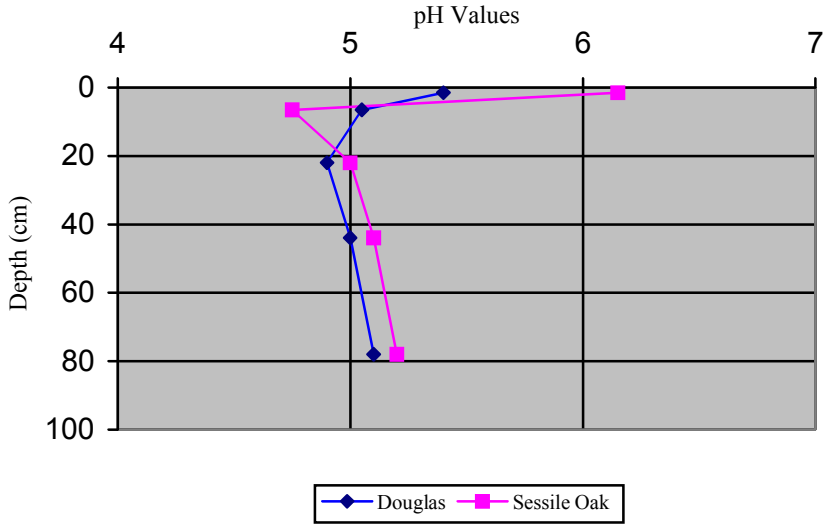
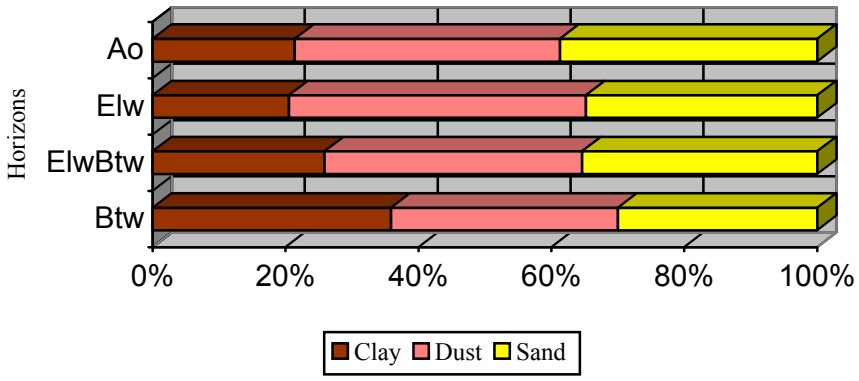


Table 1

The soil texture

Profile	Horizont	Granulometric composition(%)			Nf/Ng	Subclass
		Sand	Dust	Clay		
Douglas	Ao	36,3	43,3	20,4	24,9	Silty-sandy loam
	Elw	36,2	40,4	23,4	20,3	Silty-sandy loam
	ElwBtw	33,6	38,1	28,3	17,7	Silty-sandy loam
	Btw	39,1	22,2	38,7	25,1	Medium clayey loam
Sessile oak	Ao	38,7	39,9	21,4	24,8	Silty-sandy loam
	Elw	34,8	44,7	20,5	17,3	Silty-sandy loam
	ElwBtw	35,4	38,7	25,9	15,1	Silty loam
	Btw	30,0	34,1	35,9	14,8	Silty Clayey loam
Diffe-rences	Ao	-2,4	+3,4	-1,0	+0,1	
	Elw	+1,4	-4,3	+2,9	+3,0	
	ElwBtw	-1,8	-0,6	+2,4	+2,6	
	Btw	+9,1	-11,9	+2,8	+10,3	

The stagnic luvisol texture, Profile no.2 Sessile oak



The stagnic luvisol texture, Profile no.1 Douglas

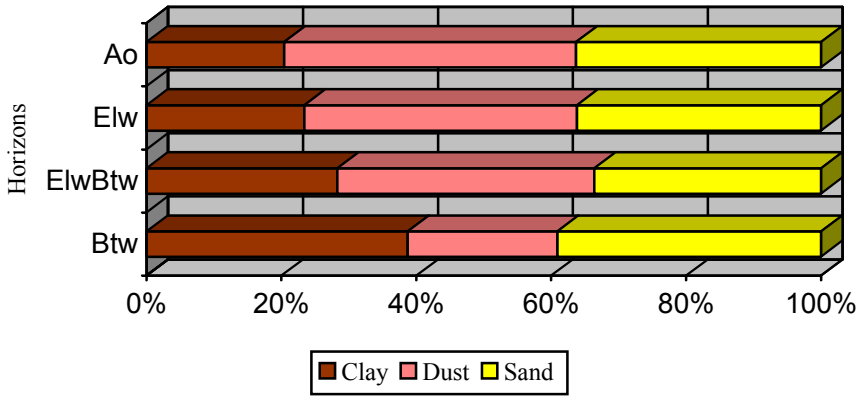


Table 2

Total nitrogen modifications (%) due to forest vegetation

Horizon	Depth (cm)	Total azoth (%)		
		Profile no.1. Douglas	Profile no. 2. Sessile oak	Differences
Ao	3 - 10	0,201	0,306	+0,105
Elw	11 - 32	0,054	0,068	+0,014
ElwBtw	33 - 56	0,033	0,040	+0,007
Btw	57 - 100	0,029	0,020	-0,009

Total nitrogen variation (N %) with depth

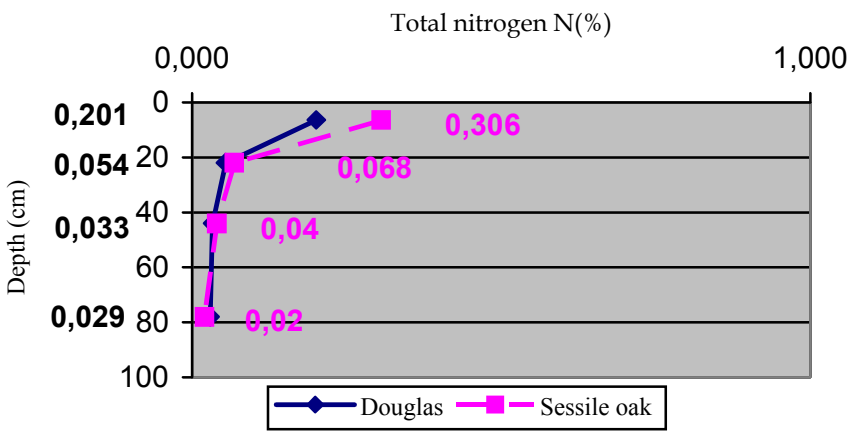


Table 3

Accesible phosphorus modifications P (p.p.m.) due to forest vegetation

Horizon	Depth (cm)	Accesible phosphorus (p.p.m.)		
		Profile no.1. Douglas	Profile no. 2. Sessile oak	Differences
Ao	3 - 10	6	19	+13
Elw	11 - 32	6	4	-2
ElwBtw	33 - 56	6	2	-4
Btw	57 - 100	2	1	-1

Accesible phosporus variation P (p.p.m.) with depth

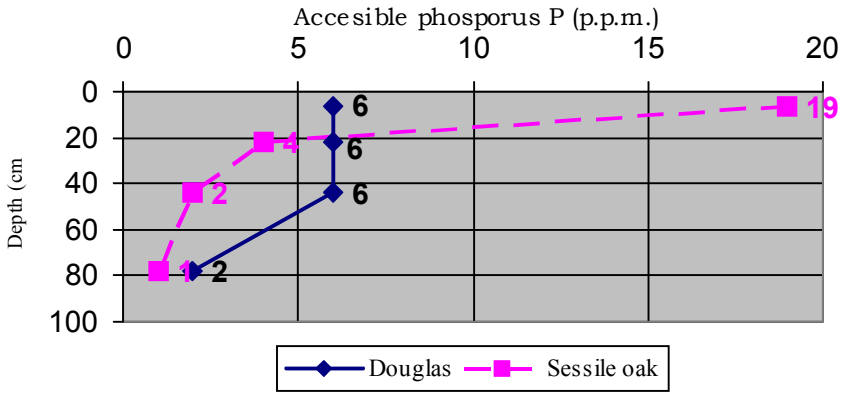


Table. 4

Accesible potassium modifications K (p.p.m.) due to forest vegetation

Horizon	Depth (cm)	Accesible potassium (p.p.m.)		
		Profile no.1. Douglas	Profile no. 2. Sessile oak	Differences
Ao	3 - 10	40	120	+80
Elw	11 - 32	30	30	0
ElwBtw	33 - 56	40	40	0
Btw	57 - 100	40	70	+30

Accesible potassium K (p.p.m.) with depth

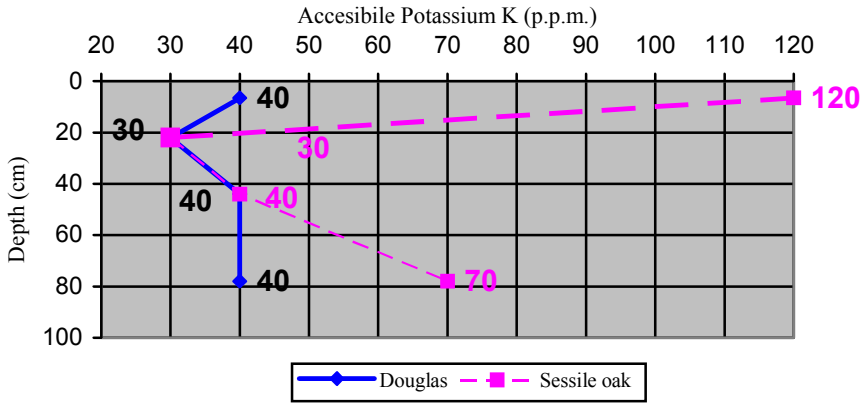
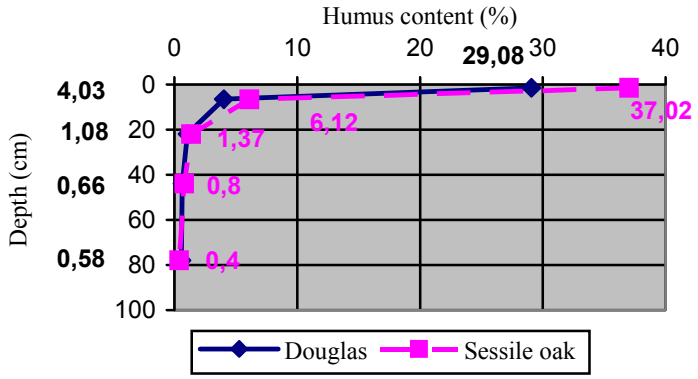


Table. 5

Humus content modifications due to forest vegetation

Horizon	Depth (cm)	Humus (%)		
		Profile no.1. Douglas	Profile no. 2. Sessile oak	Differences
O	0 – 3	29,08	37,02	+11,94
Ao	3 – 10	4,03	6,12	+2,09
Elw	11 – 32	1,08	1,37	+0,29
ElwBtw	33 – 56	0,66	0,80	+0,14
Btw	57 – 100	0,58	0,40	-0,18

Humus content variations (%) with depth



CONCLUSIONS

The total nitrogen has higher values under the sessile oak stand than under the douglas stand (remarking a difference of 0,105% in the Ao horizon of bioaccumulation), with the exception of Bt horizon in which the increment of nitrogen under the douglas stand compared to sessile oak stand in amount of 0,009 is meaningless.

The content of the accesible phosphorus is higher in case of the douglas stand than in that of sessile oak under the Ao horizon with 1-4 ppm, with the exception of the bioaccumulation horizon, where exists an increment of 13 ppm to sessile oak's advantage. The reason could consist in the stronger mobilization of the phosphorus in the more acid conditions under the douglas.

The accesible potassium has the same values in the eluvial horizon (30 ppm) as in the transitional horizon EB (40 ppm), being higher with 80 ppm under the sessile oak stand in the Ao bioaccumulation horizon and smaller with 30 ppm in Bt argic horizon.

The humus content is higher under sessile oak at all the depth of the studied profile with the exception of the Bt argic horizon, where under the douglas stand is registered a difference of 0,15% compared to sessile oak stand. The reason consists in the fact that the formed humus under douglas has a higher percentage of fulvic acid which grants a higher solubility, and because of this it was misplaced at a higher depth on profile.

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