THE EVOLUTION OF CHEMICAL PROPERTIES ON THE FORESTRY SOIL FROM U.P. II SITITELEC,O.S. TINCA, BIHOR COUNTY

Moţiu Petrică Tudor* Sabău N.C. Moţiu Ingrid Agnes*****

**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 42 year old Red oak (90 %) + Oak (10 %) forest (Quercus rubra + Quercus robur) and 72 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 39,38 % humus and 22,84 % of organic carbon while under Red oak 22,92 % and 13,29 %.

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

The evolution of forestry soils and the depth of the influence is strong dependent by the quantity of organic matter from the profile's surface.

Key words: forestry soil, proxihipostagnic luvisols, red oak tree, sessile oak tree;

INTRODUCTION

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. (Florea N., Munteanu I., 2000; Sabău N.C., et. al., 1999.).

The objective of the presented work is to show the influence of forest vegetation, represented by Red Oak tree (90 %) plus Oak (10 %), old of 42 year and 72 year old Sessile Oak, on the chemical properties of a proxihipostagnic luvisols from the area of Tinca Forest District, U.P. II Sititelec. (Amenajamentul O. S. Tinca, U.P. II Sititelec, 1998.).

In previous works we are presented the evolution of same physical and chemical properties of a proxihipostagnic luvisols from Tinca Forest District, under Douglas forestry and Sessile oak forestry influence. (Kátai J., et.al., 2000; Sabău N.C., Moţiu P.T., 2008.).

The soil is laid on a relatively flat surface with little waves, with an altitude of 140-150 m, characteristic relief of plain fields; this is a reason why it presents stagnic properties, on the superior part of the profile.

The type of herbal flora, after Beldie and Chiriţă, is: ***Agrostis stolonifera*** and other guiding plants (frequent accompanying) are: *Molinia coerulea, Galium palustre, Lysimachia nummularia, Festuca pratensis, Campanula patula, Lichnis flos-cuculi, Calamagrostis epigeios, Hieracium sp., Myosotis scorpioides, Polygonum hydropiper, Lycopus europaeus, Carex hirta* and *Veronica officinalis* (Beldie Al., Chiriţă C., 1964.).

MATERIAL AND METHODS

In order to reach the proposed objective, on the proxihipostagnic luvisols from U.P. II Sititelec were opened two soil profiles, until the depth of 0,5 m, one in the 139 A parcel, occupied by 42 year old Red Oak tree (90 %) plus Oak (10 %) (Profile no.1) and the other one in the 130 parcel, occupied by 72 year old Sessile Oak (Profile no.2) on a distance of approximately 1000 m between the profiles. (Figure 1.).

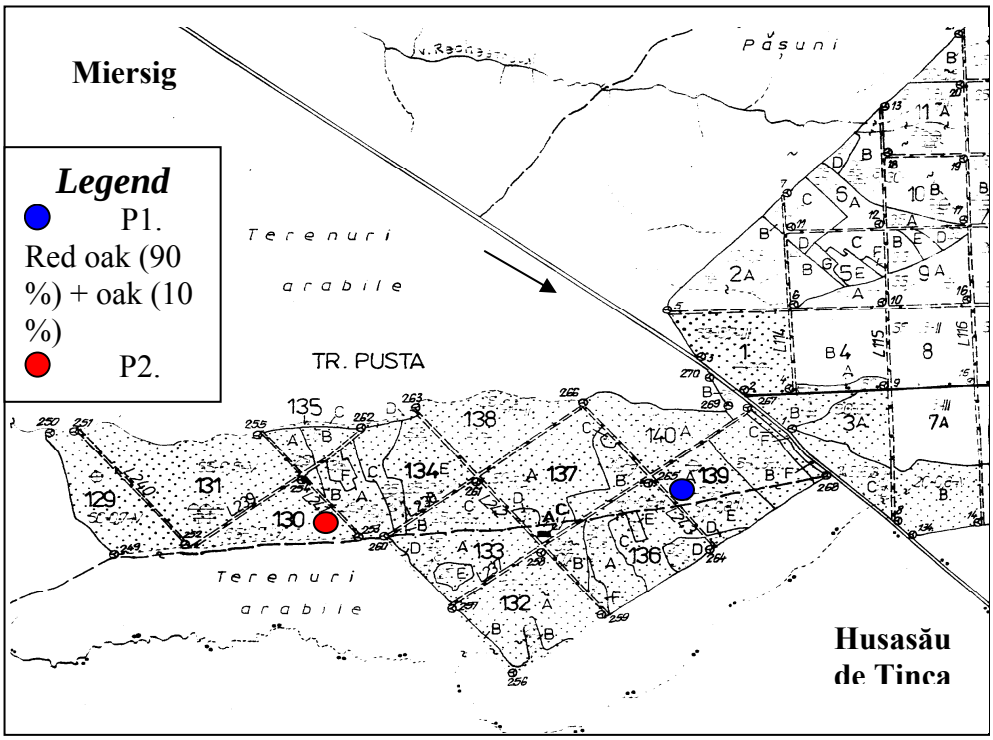

Fig.1. Emplacement of the soil profiles

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.).

The analyses of the soil was made by the „County Office for Pedological and Agrochemical Studies Oradea" in accordance to the „Methodology of Elaborate Pedologycal Studies" – The Research Institute for Pedology and Agrochemistry, Bucharest. (Florea N. et al., 1987.).

RESULTS AND DISCUSSION

The folic horizon O of unhydromorf organic matter accumulation, represented mainly by litter it has a thickness of 4 cm in both cases, having a difference through their moderate acid reaction under Sessile oak, pH = 5,75 and respectively weak acid pH = 6,05 under Red oak. (Table 1.)

Table1.

Soil reaction modifications due to forest vegetation

Horizon	Deepness (cm)	Profile 1. Red oak		Profile 2. Sessile oak		Differences
		pH	Characterization	pH	Characterization	
O	0-4	6,05	Weak acid	5,75	Moderate acid	+ 0,30
Ao	4-9	5,40	Moderate acid	5,20	Moderate acid	+ 0,20
AoBtw	9-12	4,95	Strong acid	5,10	Moderate acid	- 0,15
Btw1	12-30	5,20	Moderate acid	5,30	Moderate acid	- 0,10
Btw2	30-50	5,55	Moderate acid	5,85	Moderate acid	- 0,30

The content of humus and organic carbon is bigger under Sessile oak, 39,38 % and 22,84 % than under Red oak 22,92 % and respectively 13,29 %. (Figure 2.)

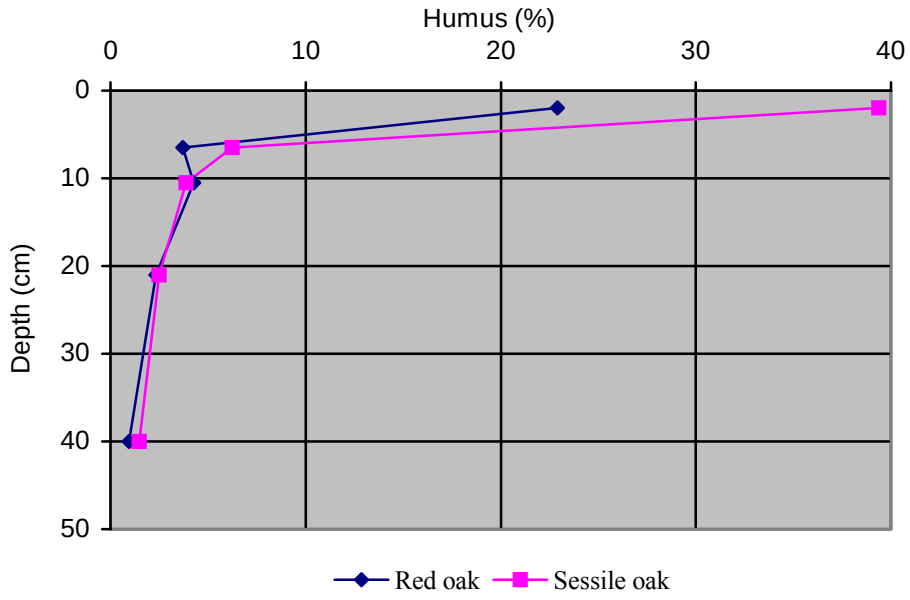

Fig. 2. Humus content variations (%) with depth

Analyzing the contents distribution of humus in the depth of those two analyzed profiles it is remarked that for both profiles the content of humus is higher in horizon O and reduced reversed proportional with the profile's depth.

But the humus from the folic horizon O is weak acid under Red oak and moderate acid under Sessile oak, and that influences the evolution of the superior part of the soil profiles. Under Sessile oak the reaction of humus is more acid than under Red oak.

As a result of long term influence of organic matter from folic horizon there had been recorded differences between the soil reactions determined on the horizons of the Sessile oak profile in comparison with Red oak profile, between + 0,30 pH units in horizon O, + 0,20 pH units in bioaccumulation of organic matter Ao and – 0,30 pH units in argic horizon Btw2.

If the reaction under Sessile oak is moderate on the whole profile studied, in case of profile under Red oak the reaction is strong acid in the AoBtw transition horizon.

The reaction is more acid, under Sessile oak than under Red oak in folic horizon O and bioaccumulation horizon Ao, in the first 9 cm and became more acid under Red oak than Sessile oak because, in the profile's depth.

This evolution tendency of the reaction on the two studied profiles is underlined by the hydrolytic acidity variation, which takes into account besides Hydrogen ion potential presented bath in soil solution and the acidity given by Hydrogen ions and Aluminum tied by the colloidal complex of soil.

The hydrolyric acidity values are included between 9,00 and 6,68 m.e./100 g of soil, on the profile occupied by Sessile oak, less than on the profile occupied by Red oak+oak with values between 1,95 and 0,72 m.e./100 g of soil, the biggest difference being remarked on the profile surfaces in Ao horizon (Table 2.)

Table 2.

Hydrolytic acidity modifications (m.e./100 g soil) due to forest vegetation

Horizon	**Depth (cm)**	**Hydrolytic acidity (m..e./100 g soil)**		
		Profile no.1. Red oak +oak	**Profile no. 2. Sessile oak**	**Differences**
Ao	4 - 9	10,95	9,00	+ 1,95
AoBtw	9 - 12	7,40	6,68	+ 0,72
Btw1	12 - 30	7,66	6,86	+ 0,80
Btw2	30 - 50	7,66	6,94	+ 0,72

In both profiles analyzed the minimal value of the hydrolytic acidity is enlisted in the depth of transition horizon AoBtw, 7,40 m.e./100 g of soil in the first profile and 6,68 m.e./100 g soil in the second profile.

In the same horizon of transition AoBtw and in both profiles analyzed, are registered the smaller pH values, 4,95 pH units (strong acid) under Red oak +oak and respectively 5,10 pH units (moderate acid) under Sessile oak. That can be in correlation with the humus content, which, in this horizon is bigger under Red oak (4,25 %) than under Sessile oak (3,88 %).

On the profile under Red oak, 42 years older, the organic matter from the profile's surface, in spite of a weak acid reaction, is too little for an positive influence on transition horizon AoBtw.

The reaction of organic matter from the profile's surface, it is more acid under Sessile oak than under Red oak + oak tree, but the quantity of the resulted humus in the 72 years is bigger and explains away why the reaction of transition horizon AoBtw is moderate acid.

The evolution of forestry soils and the depth of the influence is strong dependent by the quantity of organic matter from the profile's surface.

CONCLUSIONS

Analyzing some chemical properties of an proxihipostagnic luvisols, samples taken from two profiles in a depth of 0,5 m, first from Red oak (90 %) plus oak (10 %) forest and the second from Sessile oak forest, for the first profile the humus quantity from O folic horizon is 22,92 % with a pH of 6,05 while in the second profile 39,38 % with a pH of 5,75.

In the Ao bioaccumulation horizon the humus content is higher with 2,53 % under Sessile oak forest than under Red oak and the soil reaction is weak acid (pH = 6,05) for the first profile and moderate acid (pH = 5,75) for second profile.

The stronger acidity of transition horizon AoBtw, under Red oak forest than the reaction of the same horizon under Sessile oak forest could be explained through the quantity of organic matter, more smaller under Red oak (42 years) and more bigger under Sessile oak (72 years), in spite of a reaction (pH) more acid under Sessile oak forest.

The evolution of forestry soils and the depth of the influence is strong dependent by the quantity of organic matter from the profile's surface.

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