

The chemical properties of forest soils from Vaslui County

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Abstract Forest soils from Vaslui County occupy only 16% from the total surface of this county. This article is dedicated to the analysis of the main chemical properties of these soils. The work material is represented by soil analysis data from forest management plans realized in the period 1989-2013. In total, 289 soil profiles and 1011 pedo-genetical horizons were analyzed.

The soils characteristic of this region are field soils (phaeozem, chernozem, preluvisol) and the ones specific to low hills (luvisol and eutric cambisol).

The average humus content, nitrogen and total cationic exchange capacity for forest soils from Vaslui County are very similar for the 5 most widespread soils from this area. All soils are moderately humiferous; preluvisol is well supplied in nitrogen, while all the other soils are normally supplied with nitrogen; chernozem has a very large total cationic exchange capacity, while all the other soils have a large exchange capacity; luvisol, preluvisol and eutric cambisol are weakly acid, luvisol in the E1 horizon is moderately acid, chernozem is weakly alkaline, phaeozem is neutral in the Am and A/C horizons and weakly alkaline in C; luvisol, preluvisol and eutric cambisol are mesobasic, while chernozem and phaeozem are eubasic.

From the county's total area of 533.127 ha (2,3% from the country's total area), 72,2% is an agricultural area, 16,4% represents forests and other forest vegetation fields and 11,4% other areas (waters, constructed surfaces, roads, railways etc.) [16]. The surface of state forests administered by Romsilva National Forest Administration through its 6 Forest Districts (Băcești, Bârlad, Brodoc, Epureni, Huși, Vaslui) is of 49.412 ha [15].

Forest soils are an essential component of forest ecosystems [13, 11, 9]. The purpose of the present paper is to realize a description of the main chemical properties of soils from this county's forest area.

Key words

luvisol, phaeozem, chernozem, humus, nitrogen, pH, base saturation degree

Material and Method

The material of this paper was represented by the chemical analyses of soils harvested from Vaslui Forest District from the last three decades, due to forest management plans. The methods used in the analysis of soil samples are accredited national and international methods [7]. The following elements were analyzed: pH, humus content, basis exchange capacity (Sb), hydrogen exchange capacity (Sh), total cationic exchange capacity (T), base saturation degree (V) and total nitrogen.

Results and Discussions

Types of soils from Vaslui Forest district

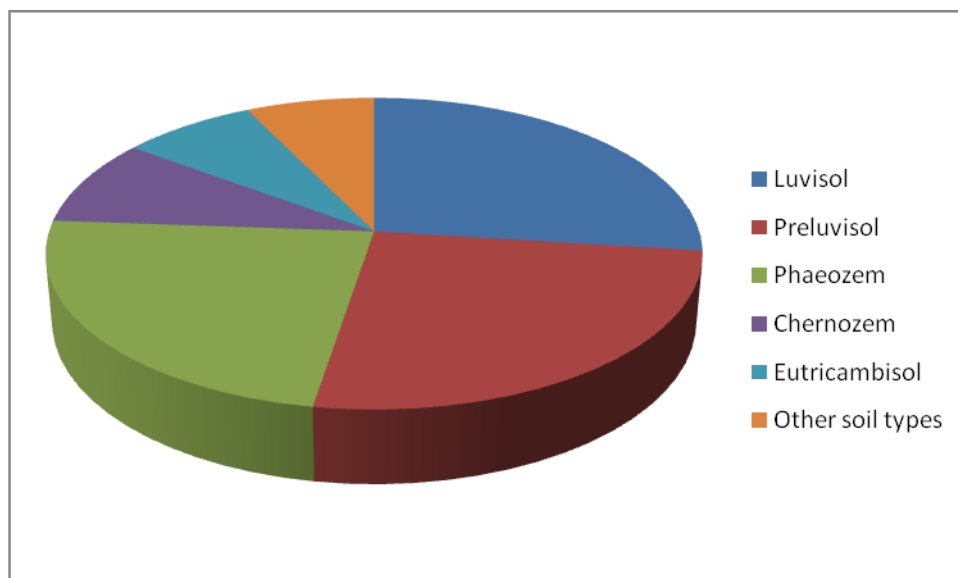


Fig. 1 The percentage of forest soils identified in Vaslui county

The most widespread types of soils are the ones from Luvisols (53%) and Chernisols (22%) classes. As soil types, the most widespread is the luvisol (27%), followed by preluvisol (26%), phaeozem (with the subtypes of haplic, argic, cambic and greic), 23%, chernozem (with the subtypes of haplic, argic and cambic), 9%, and eutric cambisol (8%). Other soil types (fluvisols, erodisols, gleysols, dystric leptosols, solonchak, stagnisols, vertisols) represent 7% of the total forest soils from this area (figure 1).

At our country's level, luvisol occupies the second place as widespread in forest soils (1.440.052 ha, meaning 22%), preluvisol occupies the 5th place (335.050 ha, meaning 5%), phaeozem 235.282 ha, chernozem 46.026 ha and eutric cambisol the 3^d place (with a total area of 869.909 ha, meaning 13%) [8]. In the area Dealurilor Fălciului, the dominant soils are: chernozem, luvisol and erodisol [5]. In Central Moldavian Tableland the dominant soils are those from Chernisol class, with almost half of studied area (42,8 %), follow by Luvisols class (33,7 %), amongst which

haplic luvisol occupies 25%. Together, these two classes totalize 66,5 % from the total area [2]. In the South – West part of the Central Moldavian Tableland intense eluviation-illuviation processes are present [1] and the soils are chernisols (30.3%), luvisols (28.4%), anthrisols (9.3%) and hydrisols (4.8%) [3]. In Tutova area, the most widespread soils are chernozems (23.5%), preluvisols (20,6%), phaeozems (16.4%) and regosols (14.8%) [12].

Total cationic exchange capacity

Regarding the total cationic exchange capacity, an average value was calculated per profile and was rendered as table for each type of (Table 1). A significant soil variability is not ascertained in Vaslui county in regard with the total average cationic exchange capacity. This varies between 27.5% at chernozem and 20.7% at preluvisol. Chernozem has a very high total cationic exchange capacity, while all the other soils have a high exchange capacity.

Table 1

Average humus content, nitrogen and total cationic exchange capacity for forest soils from Vaslui county

Luvisol	Preluvisol	Phaeozem	Chernozem	Eutric cambisol
Total average cationic exchange capacity per soil type (T-me 100 g⁻¹ sol)				
21.15	20.68	22.78	27.48	21.89
Average humus content in the A horizon per soil type (H-%)				
4.81	4.00	3.68	3.65	4.08
Average nitrogen content in the A horizon per soil types (%)				
0.19	0.21	0.19	0.18	0.20

Humus

An important soil parameter is represented by humus. In regard with this parameter, the average content from the A horizon was determined for each type of soil

identified (Table 1). The largest quantity of humus is found for luvisol (figure 2). This soil is followed by eutric cambisol, preluvisol, while phaeozem and chernozem have the lowest values of humus in the first soil horizon. All soils are moderately humiferous. The

humus quantities from this county are similar with the average values calculated for the entire country [7]. In Central Moldavian Tableland area, the decrease of

humus content was identified for the soils that evolve in a more humid climate and under forest vegetation [10].

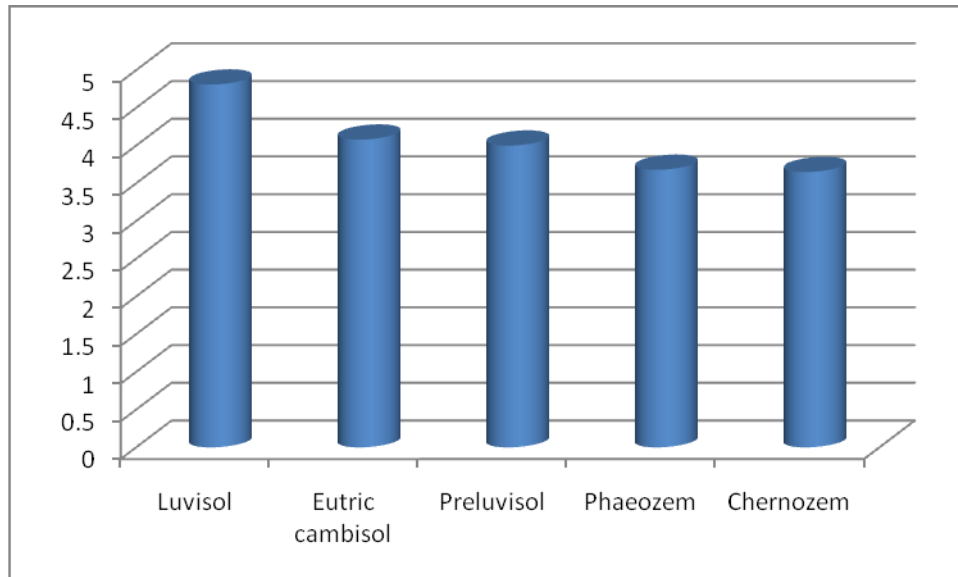


Fig. 2 The variation of humus quantity for the most widespread forest soils from Vaslui county

Total nitrogen

In regard with the nitrogen supply, preluvisol is well supplied with this element, while all the other soils are normally supplied.

As in the case of humus, the values for total soil nitrogen are almost identical for chernozem and phaeozem, two soils that are very similar and are part of the same soil class (Chernisols), have almost the same pedogenetic horizons and are different only through the presence in different quantities of calcium carbonates at high soil depths. They have the same type of horizon at the surface (Am), the humus and total nitrogen from soil being calculated in this horizon. Due to this cause, the differences for the 2 parameters between these two soils are insignificant.

Soil solution reaction

In regard with the soil reaction, this was calculated for the most widespread types of soils (luvisol, preluvisol,

phaeozem, chernozem and eutric cambisol) and on pedogenetic horizons (figure 3). Luvisol, preluvisol and eutric cambisol are weakly acid, luvisol is moderately acid in the El horizon, chernozem is weakly alkaline, phaeozem is neutral in the Am and A/C horizons and weakly alkaline in C. The luvisols from other regions of the country are situated in the same pH category [4].

Base saturation degree

For the base saturation degree (V), a diagram was realized for its variation for the most widespread soil types from Vaslui county, by calculating an average on each soil horizon (figure 4). It can be observed that the variation amplitude of this parameter is high for all soils. Luvisol, preluvisol and eutric cambisol are mesobasic, while chernozem and phaeozem are eubasic.

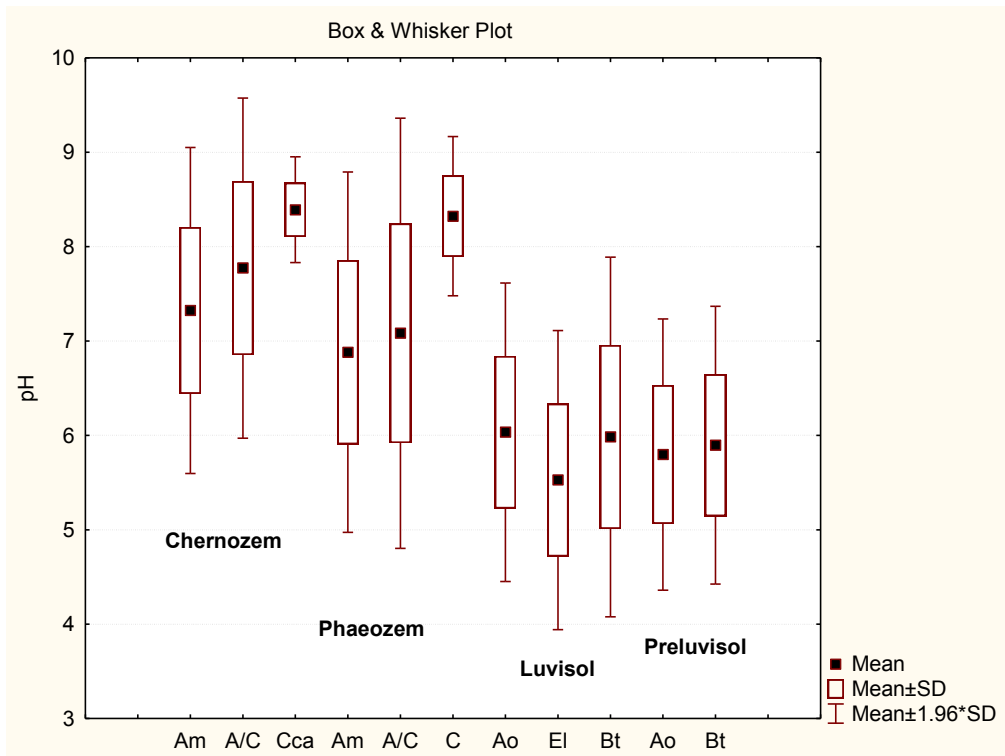


Fig. 3 pH variation of pedogenetic horizons for the most widespread forest soils from Vaslui county

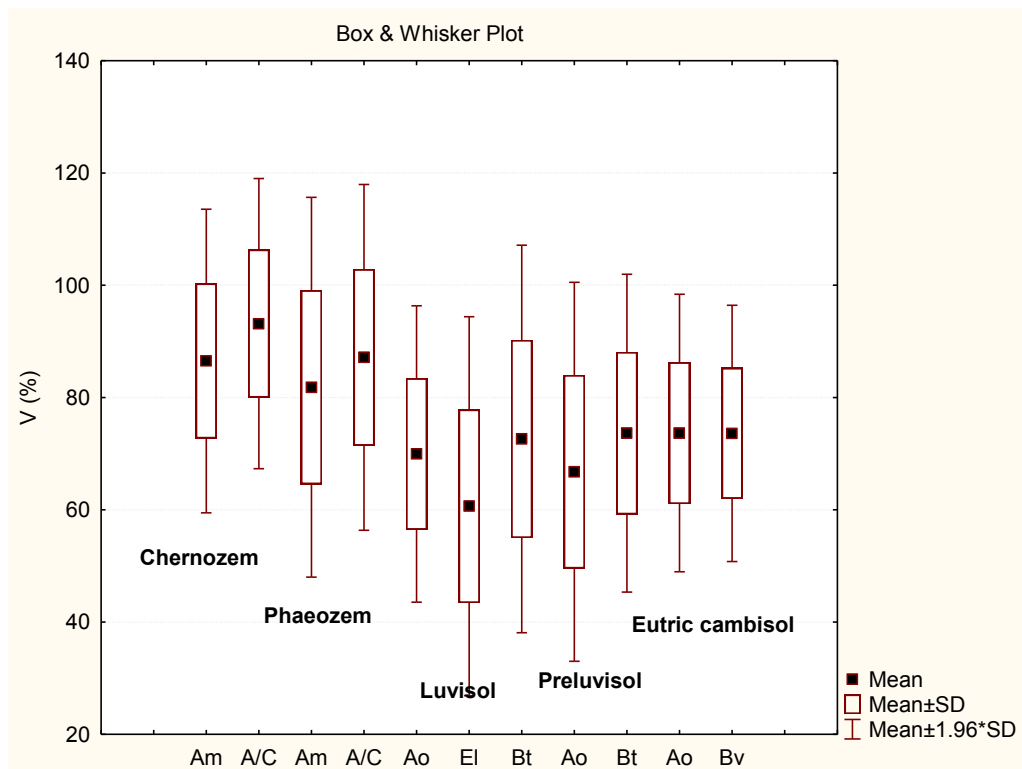


Fig. 4 Base saturation degree variation for the most widespread forest soils from Vaslui county

Conclusions

Unlike other areas of the country, numerous types of soils are present in Vaslui county (with the exception of mountain soils). Regarding their spread, forest soils from this county are grouped in 2 categories: soils with large spreading (23-27%): luvisol, preluvisol and phaeozem and soils scarcely spread (7-8%): chernozem, and eutric cambisol.

Luvisol is a weak acid soil in the Ao and Bt horizons and moderately acid in the El horizon, mezobasic, with a high total cationic exchange capacity, moderately supplied with nitrogen and moderately humiferous. Preluvisol is a weak acid soil, mezobasic, with a high total cationic exchange capacity, well supplied with nitrogen and moderately humiferous. Chernozem is a weak alkaline soil, with a very high total cationic exchange capacity, eubasic, moderately supplied with nitrogen and moderately humiferous. Phaeozem is a neutral soil in the Am and A/C horizons and weakly alkaline in C, with a high total cationic exchange capacity, eubasic, very well supplied with nitrogen and moderately humiferous. Eutric cambisol is a weak acid soil, with a high total cationic exchange capacity, mezobasic, moderately supplied with nitrogen and moderately humiferous.

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