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QUALITY OF SOME SOILS FROM THE WEST REGION OF ROMANIA

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Abstract

The paper aimed to present the quality of some soils from the West Region from Romania. The soil types who were studied occupied a surface of 54250 ha in the south part of Timiş Department and the East part of Caraş-Severin Department. This two part of departments are included in one area named Barzava Plain. It was made analyses in two depths 0-20 cm and 20-40 cm and was studied some physical and chemical properties of soils like pH, soil texture, humus content, total nitrogen content, P_2O_5 content and K_2O content. The main soil types who was founded in this area is Fluvisols (gleyic, vertic and haplic) on 6.72% from the entire surface, Chernozems (calcic, haplic, gleyic, hyposodic, vertic, luvic) on 6.97% from the surface, Haplic Phaeozems, Cambisols (mollic and gleyi-eutric) on 0.5% from the surface, Luvisols (vertic and stagnic) on 39.4% from the surface, Haplic Luvisols on 5.49% from the surface, Vertisols (pellic-gleyic and pellic-stagnic) on 27.66% from the surface, Gleysols (haplic and mollic) on 3.08% from the surface, Stagnosols (haplic and vertic) on 3.08 from the surface and Antrosols on 1.80% from the surface. The soil analyses was made on Laboratory from Soil Science Department from Faculty of Agriculture on Timişoara. The obtained results was compared with the Romanian Pedological Studies Elaborating Methodology, 1987.

Key words*: soil texture, base saturation degree, soil fertility.*

INTRODUCTION

The term of soil quality is utilized until present with different connotations; it is meaning became nowadays more comprehensive (Florea, 2007). The most adequate definition of the soil quality is: "the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality and support human health and habitations" (Karlen et al., 1997).

In Romania, the soil quality was regarded until recently from the point of view of fulfilment of the function of the soil role to yield, either by evaluation of the production potential or suitability classes for different land-use or land development (ICPA, 1987; Florea, 2007).

In the soil science, the term of quality is generally used in connections with classes of quality and rating for the evaluation different soil properties, some of them regarding to simple properties as permeability, humus content, water retaining capacity, reaction, etc., other regarding too complex characteristics as land capability, irrigation suitability, productivity potential etc. Before, the soil fertility was considered as the single and most important property of soil that integrates all together properties concerning the soil vocation to contribute to the crop production, estimated quantitatively and sometimes qualitatively (Florea, 2007).

After Brady and Weil, 2002, soil quality is determined by a series of physical, chemical and biological indicators like texture, total organic soil matter, pH, extractable N, P and K etc.

MATERIALS AND METHODS

The research was carried out in the field and in the laboratory, in order to identify and to establish the soil's properties. Collected soil samples were analysed according to the national and international methods. pH was determined by potentiometric method, in water

extract 1:2.5 ratio, using a Mettler Toledo pH-meter. Humus content was established by Turin method, improved by Gogoasa. The degree in base saturation was determined after a standard formula. The Kacinski method was used to establish soil texture. Soil potassium content was determined in ammonium-acetate lactate solution, soil extract being measured by a Varian atomic absorption spectrophotometer at 766 nm wave length. For phosphorus content it was used Egner-Rhiem-Domingo method, the samples being analysed by a C intra spectra-photo colorimeter at 660 nm wave length. The content in soil total nitrogen was established by Kjeldahl method. The soil types of the research area were verified according to the Romanian Soil System Taxonomy and after the Soil Atlas of Europe. The obtained values of soil analyses were interpreted after the Pedological Studies Methodology.

RESULTS AND DISCUSSIONS

Soil reaction is moderate acid on 51.36% from the surface and weak acid 48.64% from the surface on the 0-20 cm depth. On the depth 20-40 cm, soil reaction is moderate acid on 47.97%, weak acid on 45.06% and neutral on 6.97% from the surface (Figure 1).

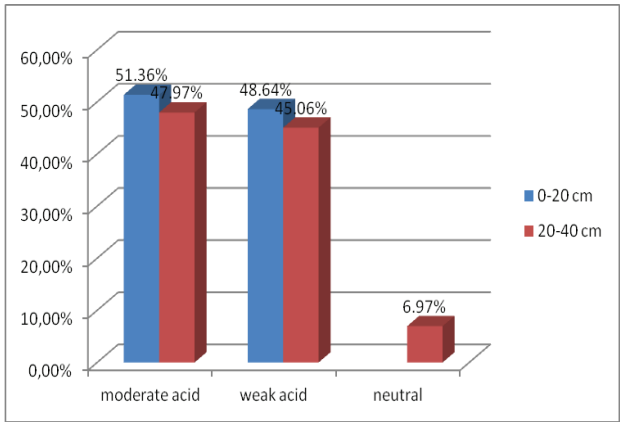

Figure 1. Distribution of soil reaction classes

Humus content is reduced on 46.41%, medium on 53.59% from the surface on 0-20 cm depth, and very reduced on 37.84%, reduced on 62.16% on 20-40 cm depth (Figure 2)

Regarding the base saturation degree we can affirm that on the 0-20 cm depth, soils is mesobasic on 51.05% from the surface, eubasic on 41.98% and base saturated on 6.97%.

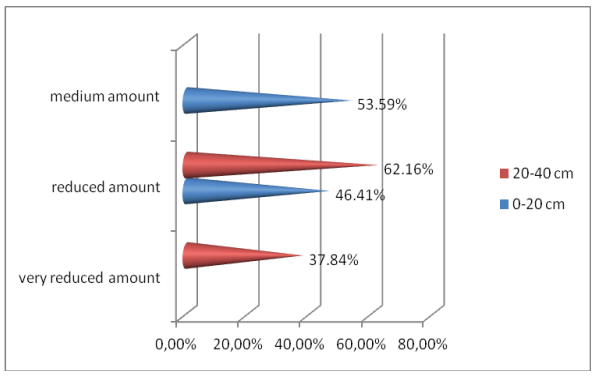

Figure 2. Distribution of soil humus content classes

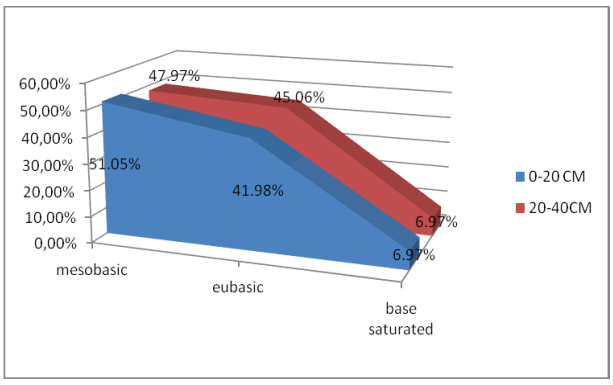

Figure 3. Distribution of soil base saturation degree classes

On the other depth (20-40 cm) soils mesobasic on 47.97% from the surface, eubasic on 45.06% and base saturated on 6.97% (Figure 3).

Soil texture is the propertie which is the most patchy in the studied area. From this point of view, the main soils types has the next percentages from total surface: loamy-sand texture on 6.72%, loamy-clay texture on 52.17%, loamy-dust texture on 5.49%, loamy texture on 4.88% and clayed texture on 30.74% for both depths (Figure 4).

Total nitrogen content has a very high amount on 100% from the surface at 0-20 cm depth, and on 20-40 cm depth is very high on 98.2% from the surface and high on 1.8% from the surface (Figure 5).

Patchy is also the P_2O_5 content who has extremely reduced amount on 1.8% from the surface, very reduced amount on 12.02%, reduced amount on 12.96%, medium amount on 45.56% and high amount on 27.66% on 0-20 cm depth. In the other depth (20-40 cm), P_2O_5 content is extremely reduced on 1.8% from the surface, very reduced on 12.02%, reduced on 58.52% and medium on 27.66% (Figure 6).

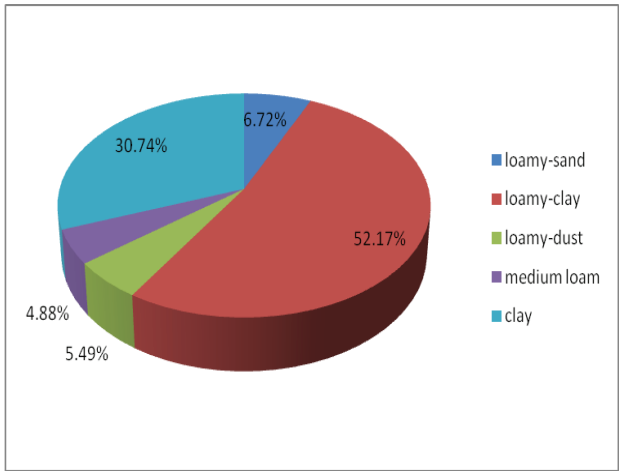

Figure 4. Distribution of soil texture classes

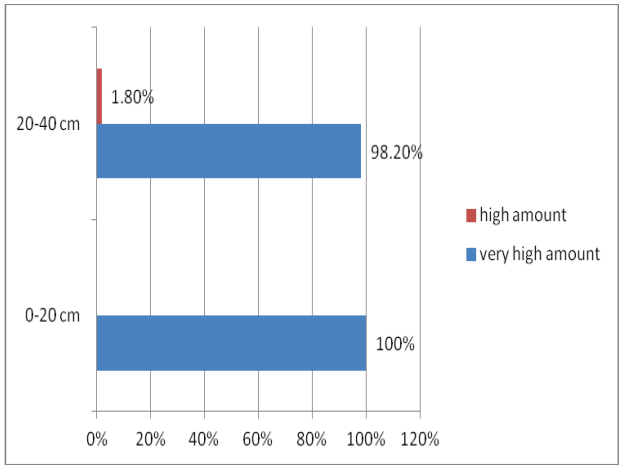

Figure 5. Distribution of total nitrogen content classes

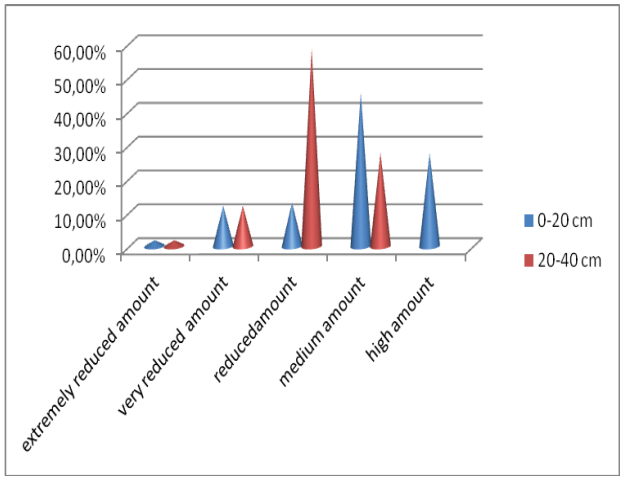

Figure 6. Distribution of soil P_2O_5 content classes

K_2O content has extremely reduced amount on 3.08% from the surface, very reduced amount on 8.52%, reduced amount on 41.53% and medium amount on 46.87% for 0-20 cm depth, and extremely reduced amount on 1.8% from the surface, very reduced amount on 6.72% and reduced amount 91.48% for 20-40 cm depth (Figure 7).

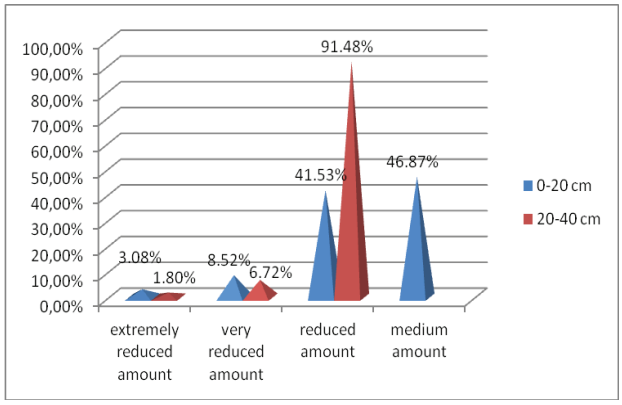

Figure 7. Distribution of K_2O content classes

CONCLUSIONS

Fluvisols has a moderate acid reaction, medium humus content on 0-20 cm depth and reduced in 20-40 cm depth, very high amount of total nitrogen, much reduced amount of P_2O_5 and K_2O, is eubasic from the base saturation degree point of view and has a loamy-dust texture.

Chernozem is moderate acid on 0-20 cm depth and neutral on 20-40 cm depth, has a very high amount of total nitrogen, a medium amount of humus in 0-20 cm depth and reduced amount in 20-40cm depth, reduced amount of P_2O_5, has a medium amount of K_2O on 0-20 cm depth and reduced on 20-40 cm depth, is base saturated from the base saturation degree point of view and has a loamy texture.

Haplic phaeozem has a moderate acid reaction on 0-20 cm depth and weak acid reaction on 20-40 cm depth, has a medium amount of humus on 0-20 cm depth and reduced amount on 20-40 cm depth, has a very high amount of total nitrogen, reduced amount of P_2O_5, medium amount on 0-20 cm depth and reduced amount on 20-40 cm depth of K_2O, is eubasic on 0-20 cm depth and base saturated on 20-40 cm depth from the base saturation degree point of view and has a loamy soil texture.

Cambisols has a moderate acid reaction on 0-20 cm depth and weak acid reaction on 20-40 cm depth, reduced amount of humus, very high amount of total nitrogen, very reduced amount of P_2O_5, reduced amount of K_2O, is eubasic from the base saturation degree point of view and has a loamy soil texture.

Luvisols has weak acid reaction, has medium amount o humus on 0-20 cm depth and reduced amount of humus on 20-40 cm depth, a very high amount of total nitrogen, a medium

amount on 0-20 cm depth and reduced amount of P_2O_5 and K_2O, is mesobasic from the base saturation degree point of view and has a loamy texture.

Haplic luvisols has weak acid reaction, reduced amount of humus, very high amount of total nitrogen, reduced amount of P_2O_5 and K_2O, is mesobasic from the base saturation degree point of view and has a loamy-clay soil texture.

Gleyisols has a weak acid reaction on 0-20 cm depth and moderate acid reaction on 20-40 cm depth, a reduced amount of humus on 0-20 cm depth and very reduced amount on 20-40 cm depth, very high amount of total nitrogen, medium amount on 0-20 cm depth and reduced amount on 20-40 cm depth of P_2O_5, extremely reduced amount on 0-20 cm depth and reduced amount of K_2O on 20-40 cm depth, is mesobasic on 0-20 cm depth and eubasic on 20-40 cm depth from the base saturation degree point of view and has a loamy soil texture.

Stagnosols has a weak acid reaction,a reduced amount of humus, very high amount of total nitrogen, medium amount on 0-20 cm depth and reduced amount on 20-40 cm depth of P_2O_5, reduced amount of K_2O, is mesobasic from the base saturation degree point of view and has a loamy-clay soil texture.

Vertisols has a moderate acid reaction, a reduced amount on 0-20 cm depth and very reduced amount on 20-40 cm depth of humus, very high amount of total nitrogen, high amount on 0-20 cm depth and medium amount of P_2O_5 on 20-40 cm depth, reduced amount of K_2O, is eubasic from the base saturation degree point of view, and has a clay soil texture.

Antrosols has a weak acid reaction, a reduced amount on 0-20 cm depth and very reduced amount on 20-40 cm depth of humus, very high amount on 0-20 cm depth and high content on 20-40 depth of total nitrogen, extremely reduced amount of P_2O_5, reduced amount on 0-20 cm depth and extremely reduced amount of K_2O on 20-40 cm depth, is eubasic from the base saturation degree point of view and has a medium loamy soil texture.

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