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DISTRIBUTION OF 1ST LEVEL MONITORING SITES PER EVALUATION CLASSES OF SOME PHYSICAL FEATURES OF THE SOILS WITHIN THE COMMUNE OF SAG, TIMIŞ COUNTY, ROMANIA

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Abstract

Located in South-Western Timiş County (45°39' Northern latitude and 21°10' Eastern longitude), on the European route E 70, Şag, the seat of the commune by the same name, is 14 km from the city of Timişoara and 3 km from Parţa, a locality that used to be part of the commune until 2004, when it became itself a commune. The Commune of Şag covers 8,664 ha, of which 8,419 ha is agricultural land. The micro-relief of the field is an alternation of negative and positive forms of which negative forms share the most. The latter are represented by a set of micro-depressions (closed or open) that are elongated (ex abandoned meanders of the rivers Bega and Timiş and of their tributaries) and, most often by smaller depressions of different shapes and size. Due to its geographical location, the territory is part of the field climate at the border between the western sub-type with ocean influences and the Banat sub-type, with Mediterranean influences; mean multi-annual temperature is 10.9°C for the interval 1943-2004 (Meteorological Station of Timişoara); mean multi-annual precipitations is 585.8 mm for the interval 1871-1975 (Meteorological Station of Răuţi), with 631.0 mm for the interval 1871-1975 and 591.9 mm for the interval 1955-2004 (Meteorological Station of Timişoara), which points to a process of aridity.

Key words: *characteristics, coefficient, soil indicators*

INTRODUCTION

Of the physical features of the soils in the 1st level monitoring sites, we monitored the following:
-the textural class of the soil in the upper horizon and in the intermediary horizon, structural instability;
-settlement degree (% v/v);
-saturated hydraulic conductivity (mm/h);
-resistance to penetration (kgf/cm^2) and edaphic volume (unit fractions). [6]
The soil types within the Commune of Şag that we have monitored are:
-vertic-salty chernozem;
-entic aluviosol.

MATERIALS AND METHODS

By grouping the land units in the map below, w see the following prevalent soil types:
-Aluviosols, 1-8 (eutric, gleyc, distric, molic, molic-salty), 1,539.83 ha, 18.37%;
-Entiantrosols, 9 (mixed), 11.71 ha, 0.14%;
-Chernozems, 10-15 (typical, cambic, cambic-alkalised, vertic-salty), 513.76 ha, 6.13%;
-Faeozioms, 16-20 (cambic, cambic-gleyc), 956.92 ha, 11.41%;
-Eutricambosols, 21-46 (typical, molic, alluvial, gleyc, molic-alluvial, pelic, alluvial-gleyc, molic-alkalised, molic-gleyc, gleyc-alkalised, pelic-gleyc), 46.23 ha, 55.15%;
-Pelosols, 47-48 (gleyc, gleyc-alkalised), 167.25 ha, 2.00%;
-Solonetzs, 49-50 (gleyc-salty), 6.60 ha, 0.08%;
-Soil associations, 701-704, 563.82 ha, 6.73%.
The agricultural land of the commune measuring 8,419 ha has the following uses: -arable 7,693 ha (91.4%),
-grassland 636 ha (7.5%),
-haymaking fields 39 ha (0.5%), orchards 1 ha and vineyards 50 ha (0.6%).

RESULTS AND DISCUSSIONS

Soil Texture
Texture or granulometric composition of the mineral part of the soil is defined by the content percentage of the different mineral

fine fractions, mainly: sand, dust, clay with specific size and features. [5]
Depending on the prevalence of a component, they have established texture classes and sub-classes. [3]
In practice, soils are currently grouped into five major classes; however, there are also soil studied that use a more detailed scale.
Soil granulometric composition or soil texture is an intrinsic feature with a relatively high level of stability and of major importance in soil characterisation, in general, and in agricultural soil characterisation, in particular.
Texture is the main limiting factor in implementing different agricultural systems since it cannot be changed through current technological works. [1]
This is why different sequences of agricultural systems, particularly soil works and irrigation regimes, but also fertilisation an crop need to be done only depending on soil texture.
The most favourable conditions are on medium texture soils (clayey-sandy and clayey) that ensure an optimum water holding, release and movement regime in the soil, nutrient holding and release regime, and optimum cation exchange. [6]
Soils with fine (clayey) texture ensure minimum conditions, while soils with coarse texture rank second.
Soil texture plays a fundamental role compare to other soil features, affecting the latter. Thus, for instance, sandy and sandy-clayey soils are excessively water permeable; they have a low water and nutrient holding capacity, a low cation exchange capacity, while clayey and clayey-clayey soils are the opposite, with low water permeability and high water holding capacity, which favours excess water processes (gleysation and pseudo-gleysation). [2]
Soils with fine texture have certain features: they are considered moist soils because colloidal clay has a high water holding capacity and they cannot release it for the plants. [4]
On such agricultural lands, traffic and work conditions are poor; hence, the short period of good working conditions.
Improper agricultural works lead to soil degradation, particularly soil physical degradation.

Table 1. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Coarse sand (2.0-0.2 mm)	%	0.7	2.3	2.2
Fine sand (0.2-0.02 mm)	%	22.2	23.6	23.8
Dust (I + II) (0.02-0.002 mm)	%	31.6	33.3	31.2
Colloidal clay (below 0.002 mm)	%	45.5	38.8	42.8
Physical clay (dust II + colloidal clay)	%	61.2	55.6	58.2

The texture is:
-clayey-clayey (AL) 0-26 cm;
-clayey-clayey-dusty (TF) 26-45 cm;
-clayey-clayey (TT) 45-55 cm;

Table 2. Entic luviosol

HORIZONS	UM	1	2	3	4
Depths	cm	0-5	18	33	55
Coarse sand (2.0-0.2 mm)	%	17.6	20.7	22.4	79.7
Fine sand (0.2-0.02 mm)	%	58.7	52.0	55.3	16.0
Dust (1 + II) (0.02-0.002 mm)	%	15.4	17.0	15.1	4.1
Colloidal clay (sub 0.002)	%	8.3	10.3	7.2	0.2
Physical clay (dust II + colloidal clay)	%	16.6	18.7	15.1	3.4

The texture is:
-medium sandy-clayey (UM) 0-33 cm;
-coarse sandy (NG) 33-55 cm.
Settlement Degree (% v/v)
This is a complex indicator characterising the soil settlement state depending on total porosity and soil texture.
It is also used in establishing the need for aeration in excessively settled soils.
Settlement degree, besides its use as a general indicator of the settlement state, is used in practice to establish the need for aeration in excessively settled soils.
Negative values of the settlement degree, particularly those below -17, point to an excessively aerated soil: the value 0 separates aerated soils from settled ones, while positive values, particularly those above 18, point to a strongly settled soil.

Table 3. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Settlement degree	%	20.1	16	16.4

Vertic-salty chernozems with settlement degree values above 18 need deep aeration works.
On settled soils, they recommend deep ploughing on optimum moisture soils.

Table 4. Entic aluviosoil

HORIZONS	UM	1	2	3	4
Depths	cm	0-5	18	33	55
Settlement degree	%	-24.47	-6.71	-1.08	-19.74

Negative values of the settlement degree, particularly those below -17, point an excessively aerated soil.
Aerated soil is the result of soil works. Ploughing increases soil volume with 20-30%, while apparent density decreases to 0.8-1 g/cm^3. Temporary aeration is useful for water holding.
It is not desirable to have an excessively aerated soil because water leaks below the root system and seed germination and plant growth conditions are improper.

CONCLUSIONS

Quality Classes
According to the main eco-pedological features and yielding capacity expressed as valuation marks, the arable land within the Commune of Şag can be classified as follows:
-1st class – 378.02 ha (4.49%);
-2nd class – 3438.32 ha (40.84%);
-3rd class – 3328.87 ha (39.54%);
-4th class – 1126.46 ha (13.38%);
-5th class – 147.33 ha (1.78%).
Analysis of Limiting Factors
The main limiting factors affecting the quality of the soil cover within the Commune of Şag are:
-phreatic moisture excess (moderate 28%, strong 13%);
-rain moisture excess (moderate 36%, strong 19%);
-high level of compactness (strong and very strong 78%);
-salinisation (moderate and very strong 12.96%);
-low portance (8.36%), humus supply (12%);
-reaction (moderate and strongly acid 28%);
For sustainable soil use, it is important to ensure proper understanding of soil quality and of the interaction with soil management by establishing the relation between cause and effect.
The diversity and great complexity of criteria in the establishment of soil agricultural quality and in the evaluation of the multiple types of damage lead to the idea that there is no universal criterion in defining soil quality.
We need to develop and diversify multidisciplinary, systemic and specific investigations.
Each type of degradation needs specific solutions.
Thus, measures meant to prevent soil degradation and to rehabilitate soils that are affected are numerous and varied.
This is why we need to increase awareness in decision-makers and in the public: broader and more efficient policy regarding the protection, improvement and sustainable use of soil need proper legislation.
The criteria and standards for soil quality protection and improvement measures need to rely on scientific research to allow proper measures depending on local conditions and restore soil quality at acceptable levels.

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