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

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Abstract

The purpose of the paper was to analyze the distribution of the 1st level monitoring sites by evaluation class of some hydro-physical features of the soil within the Commune of Sag, Timis County, Romania. Geomorphologically, the commune is located in the Banat-Crişană Plain, as part of the Western Romanian Plain, at the eastern extremity of the Tisei Plain, in the Timiş-Bega Interfluve, a unit formed exclusively by the cumulative action of the Timiş River. The area of the commune is mainly in the alluvial plain of the Timiş River and, partially, in the Bega River Plain. Positive forms, slight bumps of land (hills) are irregular in shape and are dispersed within the territory, more frequently near the ex-menders of next to the Timişul Mort River. As part of the vast Tisa Plain, the low plain where the commune is located ha a relatively low lithological evolution over the sand and gravel formations from the Pleistocene pushed by the rivers of Mureş, Timiş and Bega; during the lacustrine period, clays were deposited here: nowadays, they appear in varied situations generating a wide variety of soil types.

Key words**:** *soils, hidro-physical, indicators, values*

INTRODUCTION

In the same type of soil, suction (i.e., water holding force) and, therefore, water mobility and accessibility for the plants changes depending on moisture. [3]
Moisture values expressed as water percentage or as pF units in which occur obvious changes from the perspective of water holding, mobility and accessibility are known nowadays as hydro-physical indicators. [2]
Hydro-physical indicators are moisture values expressed as water percentage and suction units (pF or atmospheres) at which water changes mobility and plant accessibility. [5]

MATERIALS AND METHODS

Part of the Timiş-Bega hydrographic area, the territory is located in lower Timiş River basin that it crosses from East to West and drains most of the year. The role of the Timiş River in supplying surface water is obvious only during excessively rainy periods (end of winter and beginning of spring and, more rarely, end of spring). In the southern part of the area, there is the Timişul Mort, an ex-course of the Timiş River, polluted over a long period by wastes from the pig farm in Pădureni. Sustainable use of the soil supposes measures for the maintenance of potential productivity of resources and monitoring their evolution based on parameters and indicators of the changes in the soil quality. Such quality indicators are pressure on soil resources, changes in soil quality, and societal response to these changes. Some economic parameters and indicators of soil quality are already used. They are meeting edaphic crop and other human activity requirements, soil behaviour as an environment for biomass production, soil suitability for different uses, soil role in recycling urban and home wastes, wastes, and residues. [4]

RESULTS AND DISCUSSIONS

The main hydro-physical features of the soils in the 1st level monitoring site are:

-wilting coefficient (%),
-water holding capacity in the field (%),
-useful water holding capacity (%),
-total water holding capacity (%),
-maximum water release capacity (%).

Wilting Coefficient (%)

Wilting coefficient (% g/g) is the soil water content at which plants wilt irreversibly. It is calculated based on the wettability coefficient. The numeric value of the wilting coefficient is the lower limit of the water content available for the plants. Moisture in wilting coefficient characterised the soil type and depends on the plant and on soil texture mainly, together with some effects of the matter content. [1

Table 1. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Wilting coefficient	%	17.70	15.15	16.05

Wilting coefficient has high values between 0-55 cm.

Table 2. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Wilting coefficient	%	2.96	3.66	2.57

Wilting coefficient has very low values between 0-33 cm.

Water Holding Capacity in the Field (% g/g)

Water holding capacity in the field (% g/g) is the water content that the soil has on a sustainable basis.

It depends mainly on soil texture and apparent density.

Water holding capacity in the field is the upper limit of water content available for the plants; above this value, water is no longer hold sustainably in the soil.

Table 3. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Water holding capacity in the field	%	23.65	26.55	26.77

Water holding capacity in the field has high values between 0-55 cm.

Table 4. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	Cm	0-5	18	33
Water holding capacity in the field	%	12.08	14.34	10.84

Water holding capacity in the field has low values between 0-33 cm.

Useful water holding capacity (% g/g)

Useful water holding capacity (% g/g) is the interval between wilting coefficient and field capacity and it represents the amount of water available for the plants and hold in the soil sustainably for the plants.

Table 5. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	Cm	26	45	55
Useful water holding capacity	%	7.95	11.4	10.72

In the horizon 0-55 cm, useful water holding capacity varies between very low values and medium values.

Table 6. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Useful water holding capacity	%	9.12	10.68	8.27

Water holding capacity in the field has low values between 0-33 cm.

Useful water holding capacity (% g/g)

Useful water holding capacity (% g/g) is the interval between wilting coefficient and field capacity and it represents the amount of water available for the plants and hold in the soil sustainably for the plants.

Table 7. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Useful water holding capacity	%	7.95	11.4	10.72

In the horizon 0-55 cm, useful water holding capacity varies between very low values and medium values.

Table 8. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Useful water holding capacity	%	9.12	10.68	8.27

In the horizon 0-33 cm, useful water holding capacity has low values.

Total Water Holding Capacity (% g/g)

Total water holding capacity (% g/g) is the amount of water that the soil can hold to keep the porous soil layer full of water.

Total water holding capacity is determined by the soil settlement state, which depends on clay content and organic matter content.

Table 9. Vertic-salty chernozem

HORIZONS	UM	1	2	3
Depths	cm	26	45	55
Total water holding capacity	%	26.08	27.91	27.76

In the horizon 0-35 cm, Total water holding capacity has medium values.

Table 10. Entic aluviosol

HORIZONS	UM	1	2	3
Depths	cm	0-5	18	33
Total water holding capacity	%	52.45	37.73	30.70

In the horizon 0-5 cm, Total water holding capacity has very high values.

Analysis of Limiting Factors

To eliminate or reduce these limitations, we need to apply works to prevent phreatic and rain moisture excess (soil works under optimum moisture conditions, proper crop rotation that include improving crops, etc.) on about 34.31% of the area, lime treatment periodically on about 30% of the area, land improvement works that aim at improving salty soils or moisture excess soils on about 28% of the area, capital levelling and modelling on about 8.8% of the area, and remedying and maintaining the exiting drainage system.

We also need to improve the physical state of the soils on areas affected by surface degradation processes (crustification, dusting, warping of porous area, etc.) to reduce the number of soil works, to introduce long-run crop rotation with protective crops, to control diseases and pests in an integrated way, to apply improving fertilisers, etc.

As for improving fertilisation, we need to pay proper attention to the use of demi-liquid and liquid animal waste on poorly drained, frozen soils, on lands located in the near vicinity of water courses and to avoid applying excessive amounts of fertilisers or to choose improperly the time of application.

Special attention should be paid to nitrogen fertilisation because of the complexity of this nutrient and of the ease in losing it as nitrates through infiltration water and surface leakage.

The amount of mineral and organic fertilisers applied per area unit should not exceed 170-210 kg of N/ha/year.

For exploitations in vulnerable areas, it is forbidden to apply amounts above these limits.

CONCLUSIONS

A policy meant to protect soil quality at national level should not rely on criteria specific to a given area only.

Thus, we should use generic criteria when making up strategies and planning protection measures, while aspects related to specific locations or areas should be part of a special soil quality monitoring system.

Any change of soil quality, before and after applying protection and improvement measures should be part of a special soil quality monitoring system.

This is necessary because we need to check any damage sign cause by humans or by nature and capture evolution trends.

In order to detect trends of soil quality deterioration in advance, soil quality control should be repeated at regular intervals of time.

REFERENCES

[1]Blaga, Gh., Rusu, I., Vasile, D., Udrescu S., 1990, Fizica solurilor agricole, Editura Ceres, Bucureşti.

[2]Duma Copcea, A., 2006, Solurile judeţului Mehedinţi şi favorabilitatea lor pentru culturi agricole, Editura Eurobit, Timişoara.

[3]Duma Copcea, A., Stroia, M.S., 2007, Ştiinţele solului. Editura Agroprint, Timişoara.

[4]Duma Copcea A., 2012, Pedologie, Editura Agroprint, Timişoara.

[5]Duma Copcea, A., 2014, Managementul proiectelor de dezvoltare durabilă.

[6]Rusu, I., 2001, Pedologie, partea I, Editura Solness, Timişoara.