USING PEDOLOGICAL INFORMATION TO DEFINE LAND PRODUCTIVITY AND ENVIRONMENTAL PROTECTION IN MOUNTAIN AND PRE-MOUNTAIN AREA OF TIMIS COUNTY

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Abstract: *The purpose of research is accumulating scientific data on the physical, chemical and microbiological properties of soils, data found in soil studies prepared by local OSPA since 2003, necessary to support a methodology for assessing their skills through a complex firm approach of physical, geography and soil conditions of the considered space. Between soil characteristics and main species cultivated or spontaneous, can establish relationships of a diverse and complex reciprocity. Soil characteristics can exert influence on the development of the root system, mineral nutrition, providing aero-hydric and thermal regime needed to carry the main physiological processes and plants, in turn, acts both directly and indirectly on the state of soil fertility. Research on eco-metrical function of the main physical and chemical characteristics of soil have been taken by many scientists, in the country and abroad, since the beginning of last century and the German classification system was designed mainly based on soil texture in the so-called phase of its evolution. Physical and chemical properties of soil samples (texture, pH, humus content and N,P,K etc.) and the biochemical and microbial diversity of samples were analyzed in USAMVB-OSPA Timisoara Research Laboratory, after national norms and standards, approved by the Standards Association of Romania (ASRO). Knowledge of these features of the soil have special theoretical and practical importance. Theoretical, it provides to specialist the possibility to interpret the phenomena that occur in soil and to predict soil evolution in particular and the environment in general, in terms of present and future health, and practical because warns the physician as what measures should be taken to bring the soil in optimal conditions for growth and development of cultivated or wild plants. Importance, originality and timeliness of work is the need to protect the edaphic layer and environmental protection by: The accumulation of scientific data necessary to support technologies of conservative tillage and sustainable management of soil and water resources, Implementation of conservative tillage and sustainable management of physical, geographical and edaphic conditions from mountain and pre-mountain area of Timis county.*

Keywords: *biodiversity, cooperation, cohesion, sustainability, monitoring, risk*

INTRODUCTION

Along with systematizing, modernization and development of buildings, pathways, communications and utilities (water, heat, electricity, sewerage, gas, telephone networks, etc.), the study of rural resources, represented generically by the agricultural, forest and social land, allowing its priorities for rehabilitation by retraining and rebuilding (Man, 2001).

For Romania, the countryside, by the size, structure and function, has a special significance. First, the Romanian rural space is expressed by its share in land area (93.70% of the total surface), and the share of rural population (in this space are living almost half of the population, about 45%), is an reference in defining its role in the whole national territory.

Of course, the existence and growth of any society, regardless of its type, is unimaginable outside these resources, who have an determined share, by the progress of society.

Being a well-defined condition, with a high variability in space but relatively stable over time, the pedological factors, through the major components are essential in characterizing certain areas of the land surface.

Of course, knowledge of natural conditions and ecological features of the proposed zoning of land for various utilities and some cultures have great social and economic importance both for large and for small farm producers.

In this context, the major directions of the Romanian school of Pedology (Coste et all 1997, Dumitru et all. 2000, Florea 1987, 2003, Ianoş et all.1994, Posea 1997, Rogobete et all. 1997,2011, Teaci 1980,1995, Ţărău et all. 2004) on research to provide a unified framework of land to meet the needs of sustainable agriculture and environmental protection will need to address in order to connect to the European system, in full accordance and harmony, the following specific earth functions namely: environmental, economic, technical, social and legal function.

Given these considerations, the authors of this paper tries to present some aspects regarding the use of soil information in promoting environmentally friendly farming practices, soil studies and gathered information stored in the archive of OSPA Timisoara, but also based on SPED 1 system from 1988 and BDUST- system implemented by ICPA Bucharest in territory since 2003.

MATERIAL AND METHODS

The studied area covers 132,958 ha of land, of which 88,425 ha of agricultural land (Table 1).

Table 1

Areas structure for the main land use in mountain and pre-mountain area of Timis county

Crt. No.	Locality	Arable	Pasture	Hayfield	Vine -yard	Orchard	Total agricultural	Forest	Waters	Others	Total
1	Balinţ	3601	1160	103	0	71	4935	242	93	290	5560
2	Bara	2192	2350	708	0	444	5694	823	336	214	7067
3	Bethausen	4764	2066	318	0	107	7255	1265	139	368	9027
4	Bârna	1792	1568	513	2	60	3935	3750	11	166	7862
5	Curtea	862	1211	225	0	110	2408	1872	22	132	4434
6	Darova	7343	1283	602	0	144	9372	629	76	382	10459
7	Dumbrava	3335	977	329	1	174	4816	549	39	263	5667
8	Făget	4795	3816	920	1	68	9600	4828	84	575	15087
9	Fârdea	1478	2417	589	3	209	4696	7727	426	258	13107
10	Margina	1821	1843	1223	0	62	4949	7931	63	342	13285
11	Mănăştur	1830	1037	180	0	52	3099	878	40	169	4186
12	Ohaba Lungă	2208	1948	737	4	53	4950	5256	21	252	10479
13	Secaş	1946	2265	569	0	226	5006	607	20	134	5767
14	Traian Vuia	4111	1392	176	1	318	5998	577	112	289	6976
15	VVDelamarina	6950	2045	812	1	1904	11712	1721	58	504	13995
	TOTAL	49028	27378	8004	13	4002	88425	38655	1540	4338	132958

OJCPI Timiş/ Statistical report on the state of the land on 31.12.2006.

The research of the eco-pedological conditions was made according to "The methodology of elaborating of pedological studies", vol. I, II and III elaborated by the ICPA Bucharest in 1987, completed with specific elements from the Romanian System of Taxonomy of Soils (SRTS-2012).

RESULTS AND DISCUSSIONS

Timis County is located in the western part of Romania, between coordinates 20˚16' (Beba Veche) and 22˚23' (Poieni) east longitude, 45˚11' (Lăţunaş) and 46˚11' (Cenad) northen latitude.

The territory is crossed from east to south west of Bega, Beregsău and Timis rivers, with its tributaries: Timişiana, Pogăniș and Bârzava. In the north its course from east to west the arm Aranca, the old course of Mures.

Timis county landscape is characterized by a great diversity of landforms, generally related to the genesis and evolution of the entire Carpathian-Danubian relief.

In Timis county morphology can see three distinct areas (Fig. 1):

- eastern sector, the highest, formed by northern branches of Poiana Rusca mountains
- central sector, consisting of hills and piedmont plains
- western sector, the lowest altitude, formed by low plains, subsidence and meadows.

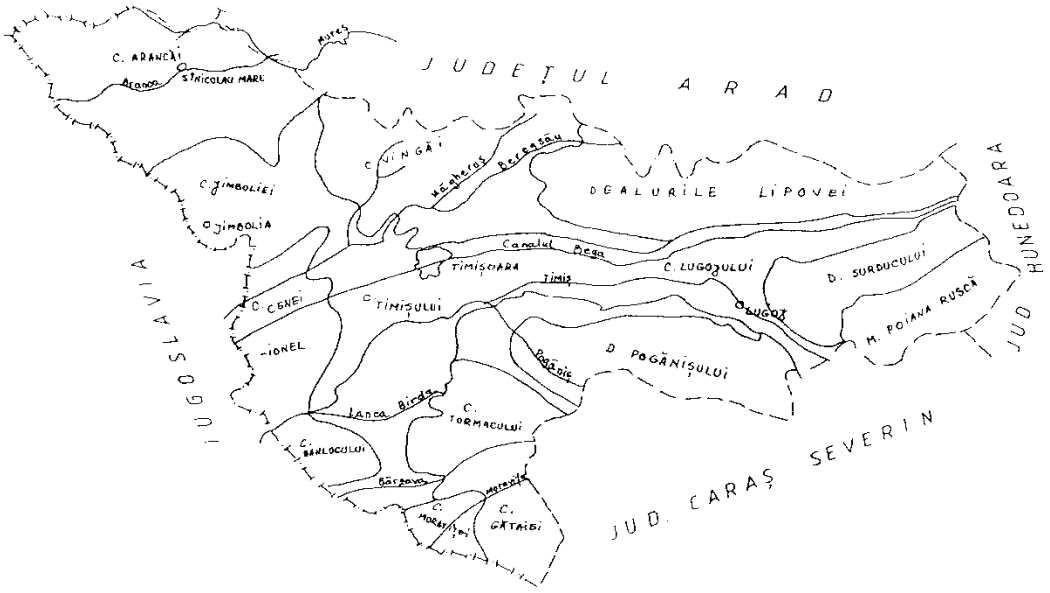

Fig 1. The main physical-geographical units

The considered space area represented by the 15 local government units (ATU) is located in the eastern sector, represented by Lipova hills, Surduc hills, Poiana Rusca mountains, Pogăniș hills and Lugoj-Făget depression.

Poiana Rusca Mountains, is situated at north of Ţarcu mountains. It is bordered to the east by Haţeg and Strei depressions, at south of Bistra tectonic corridor, in the west by Caransebes Depression and at north of Mures and Bega corridor.

Its relief is in the form of large and gentle peaks, with moderate heights and valleys narrow radial. Eastern half of the mountain is composed of an extensive plateau, where there are more speed leveling, intensely inhabited for over two millennia.

The massif is constituted mostly of with intrusions of crystalline limestone and dolomite, plus sedimentary formations in the periphery basin Rusca Montana is rich in iron and nonferrous mines, marble etc.

Lipova hills, known as the Lipova Plateau, is the largest hill, between Mureş to the north and Bega at south. They are consist of clay, marl, sand and gravel underlying a crystalline foundation, over which was deposited a coating of reddish clays and subsequently modeled by tributaries on the right bank of the Bega river.

Surduc Hills, located at the contact with Poiana Rusca mountains on line Crivina - Hăuzeşti - Gladna Romana - Zolt - Tomeşti, know full development to the west, between the valleys of Timis and Bega. Consist of clays, sands and gravels with a foundation in basic-occurring crystalline form of a spur near the village Bucovăţ.

Pogăniş Hills (Buzias), also known as Sacos Hills, named after one of the oldest villages in the area, are a continuation to the northwest Dognecea mountains who over settled Sarmatian and Pontian deposits, represented by sandstones , marl, clay, and later, heterogeneous deposits of gravel and sand.

Lugoj-Faget depression, contoured on Bega and Timis rivers hidrographic axis, bounded on the north by the Lipova hills, at south by Pogăniş Hills, the sinking of grabens area, since the Lugoj sector it branch the NE direction Faget-Ilia, where connects to Mures corridor, and for SE to Caransebes to Timis gorge on Areniş,

As a result of interaction pedogenetic factors, has resulted in a large population of soil, with evolving characteristics with agricultural land productivity varies from place to place, short distances as a result of physical and geographical conditions diversity intrinsic characteristics of soils and anthropogenic interventions occurred over time.

Crop production can be done in the most diverse conditions: natural ecosystems (without or with little human intervention), or agro-ecosystems, extensive or intensive (with direct or indirect involvement of the state) imposes an urgent need as deep knowledge of all ecological determinants.

Each soil and land units (TEO) identified were characterized using the 23 indicators of evaluation, indicators representing characters and qualities more important, significant, specific and measurable, which are usually used in pedological mapping work developed after 1987 by OSPA territorial, under methodological guidance of ICPA Bucharest.

So, based on data extracted from soil and agrochemical studies from OSPA Timisoara archive and processed according to the Methodology of the Soil Survey (ICPA Bucharest 1987) and other laws updated by MAAP Order 223/2002 agricultural land area mentioned were classified into the following quality (fertility) classes for arable use category (Table 2).

The vast majority of land hovering in III, IV and V classes and after evaluation marks weighted average value calculated for each ATU, and the entire area considered if complying with IV grade, except ATU Fardea set the V class with weighted average of 20 points).

Class II groups lands with small limitations or restrictions, (with notes of evaluation between 61-80 points) due to clayey-sandy texture, weak acid and alkaline reaction, periodically moisture excess.

Require works to prevent and combat periodically moisture excess (rain or groundwater), application of organic fertilizers and green manure at short intervals of 1-2 years, with limestone and dolomite amendment, according to values of agrochemical results.

Table 2

Fertility classes (quality) of land for arable use category (ha)
(based on data extracted from the OSPA Timişoara archive)

Crt. no.	Locality	Surface ha	Class I (81-100 pct.) ha	Class a II-a (61-80 pct.) ha	Class a III-a (41-60 pct.) ha	Class a IV-a (21-40 pct.) ha	Class a V-a (0-20 pct.) ha	Arable Average Rating
1	Balinţ	5288	53	855	1029	2018	1333	**31**
2	Bara	6088	0	70	2056	2040	1922	**29**
3	Bethausen	7626	35	592	2038	3735	1226	**34**
4	Bârna	4062	0	199	766	1301	1796	**32**
5	Curtea	2529	0	78	757	1080	614	**35**
6	Darova	9759	80	583	3059	3973	2064	**36**
7	Dumbrava	5050	25	396	1707	1963	959	**35**
8	Făget	10035	46	378	3306	3937	2368	**33**
9	Fârdea	5054	0	0	306	2073	2675	**20**
10	Margina	5288	8	101	2070	2160	949	**35**
11	Mănăştur	3238	0	162	986	1023	1067	**31**
12	Ohaba Lungă	5180	0	209	1243	1920	1808	**30**
13	Secaş	5132	0	27	790	2690	1625	**25**
14	Traian Vuia	6286	95	787	2066	2152	1186	**40**
15	V.V. Delamarina	12093	38	835	3954	5165	2101	**37**
	TOTAL	**92708**	**380**	**5272**	**26133**	**37230**	**23693**	**33**
	%	**100**	**0.41**	**5,66**	**28,21**	**40,16**	**25,56**	

Class III groups lands with medium limitation or restriction (with notes of evaluation between 41-60 points) represented by soils with moderate and strong acid reaction, with periodic regime stagnant of water from rainfall or affected by mild to moderate erosion, risk of rapid acidification of soil disturbance, poor probability nutrition with nitrogen and phosphorus, aluminium toxicity probability at most plants and magnesium toxicity for the sensitive plants.

Require amendment with limestone and dolomite, with return every 4-5 years, partially fermented organic fertilizer every 3-4 years, fertilization with N, P, K, while keeping the redox environment favourable improving aero-hydric regime with appropriate pedo-hydro-ameliorative works (ditches, culverts, channels, coastal, drainage, etc.)

Class IV, groups lands with large limitations and restrictions (with notes of evaluation between 21-40 points) and includes hydromorphic soils with physical, physical-chemical and hydro-physical unfavourable characteristic. For use as arable land is necessary to apply a set of specific ameliorative measures: drainage, gypsum amendment, specific agricultural technique, appropriate choice of plants (sorghum, barley, clover, lupine, etc.).

Class V, group land with severe limitations and restrictions, with notes of evaluation between 1-20 points) which includes lands affected by strong erosion, soils with excessive landslides or stagnant excess moisture. These lands have the risk of fertilizers driving on slopes, nutrition disorder probability of macro and micro-elements depending on soil or parent material. For better use of these soils, conservation and protection is the need for complex works associated with extensive afforestation works.

CONCLUSIONS

Between relief and edaphic factors and conditions, determined the production capacity of the land, soil conditions are a major component with multiple events both in terms of their characteristics and of the "depositary" of the influence of other environmental factors, recorded at a time in a certain place, they are more stable and easier while recording and studying (even

with current equipment, specialized units, less efficient than other branches of the national economy in terms of their ecological efficiency).

Systematic soil mapping and soil agrochemical studies, conducted by the Office of Soil and Agrochemical Studies in our country provides valuable data on the state of soil quality, establish and implement differentiated culture technologies, conditional evaluation and determining land favourability for various crops, substantiation land improvement works and technology improvement, organization and systematization territory, etc.

This paper provides basic knowledge and methodological elements for the evaluation and characterization of the natural and anthropogenic resources, change in the hope that the information presented will interest the maker so in future, the agricultural research and practice with environmental protection will strive for development interdisciplinary studies, not being able to talk about a healthy environment without a healthy soil.

Such a detailed knowledge of productive and technological characteristics of predisposing factors, restrictive or limiting of agricultural production in terms of both current event and in terms of real possibilities for modifications thereof may be better for decision makers (government, administration local) a valuable tool for achieving the most appropriate practical measures for biomass production plant in behalf of man to improve his living conditions and the entire community.

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