ECOPEDOLOGICAL RESOURCES FROM BANAT AND THEIR SUITABILITY FOR THE MAIN AGRICULTURAL CROPS AND TREE SPECIES

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Abstract: *The existence and economic development of any society, regardless of its type, is unimaginable outside material resources of the biosphere that have owned and have a weight determined by the progress of society, the primary issue at the beginning of the XXI se¬col is to ensure agricultural production at an level asked the explosive growth of world population. In this sense, the knowledge of ecopedological resources should be one more intensely imperative of modern agriculture that turns soils (fertilization and improvements as well different ways), and plants (creation of new varieties and hybrids). The paper provides the basic knowledge and methodological elements for inventory, classification and assessment of ecopedological resources for their sustainable use integrating itself in the wider complex study of natural resources and to realize them with the environment protection at a time when It is felt the need to educate society about the importance of soil as the basis of existence of human community, and support component of terrestrial ecosystems. In this context the purpose of research undertaken is the collection, processing and interpretation of soil information for evaluating the quality of cover soil and its origins in preoccupations scientific and practical today's increasingly hard to identify and put in place an integrated management of agro-ecosystems, environmental for soil and environment conservation. The subject is the land situated between Mures (north), the mountain Poiana Rusca, Ţarcu, Godeanu, Cerna and Mehedinti (east), the Danube (south) and the state border with Serbia (southwest) and Hungary (northwest) or soils identified in that area. They were studied in relation to environmental factors, natural and modified by man, which determines existence, together forming units of homogeneous ecological area (TEO) with specific suitability and different technological requirements, placing the work in current concerns of agricultural research and practice at national and international level for the study of relations between ecopedological conditions and productivity of farmland.*

Key words: *resource, Banat, soil, crop, agriculture*

INTRODUCTION

To determine the complex relationships established between different soil properties, have been taken, both in our country and in the world, many researches that have elucidated a number of causalities mutual thereby helping to define taxa of soil, both in terms of genetic, and the fundamental characteristics relative to their differentiated contribution on land productivity and their suitability for plants.

Between these geomorphological and hydrological characteristics and interrelations are set that determine the crops, to the extent possible date feature different climatic zones (Teaci, 1980), depending on their quality.

The quality of the land (soil) in the sense of Soil school in Romania, represents all the essential characteristics and peculiarities (defined in terms of topographical, geological, geomorphological, pedological, agrochemical etc.) that some portion of Earth's land surface it differs from the others, being better or worse (D. TEACI, 1980). In the terminology of FAO, "land quality" is defined as a complex of factors that influence the sustainability of land for the intended purposes, the term "land" referring to: soils, landforms, climate, hydrology, vegetation

and fauna, also including land improvement and other management etc. (FLEISCHHAUER AND EGER, 1998 CITED BY M. DUMITRU, 2002).

The sustainable management of natural and anthropogenically induced resources is a modern form of land management, with the purpose of maintaining and increasing soil fertility and enable long-term achievement of high quality food production.

Given these considerations, the present paper attempts to present some aspects of qualitative assessment of agricultural land in the area considered, on the base of Information from soil and agrochemical systematic, carried out by OSPA (Timisoara and Arad) in several cycles mapping (5-6), plus long experience with fertilizers and crop rotations and INCDPAPM and ASAS network, together with data from ground monitoring system and other occasional research on soil quality and environmental pollution.

MATERIAL AND METHODS

The issues addressed concerns an area of 1891694 hectares, located in southwestern Romania (Table 1.) Of which 1,183,343 ha are agricultural land (62.56%), which administratively belong in Timis, Caras-Severin, part of Arad county (only the area south of Mures) and Mehedinti (several locations west of Orsova).

Table 1

Surface structure for the main categories of use

Specification	***AR***	***PS***	***FN***	***VII***	***LV***	***AG***	***Pdt***	***Other***	***Total***
Timiş	*528242*	*123552*	*28535*	*4695*	*8393*	*693417*	*109465*	*66783*	*869665*
%	**60,74**	**14,21**	**3,28**	**0,54**	**0,96**	**79,73**	**12,59**	**7,68**	**100**
Caraş-Severin	*126873*	*183341*	*74562*	*771*	*11452*	*396999**	*411276*	*43701*	*851976*
%	**14,89**	**21,52**	**8,75**	**0,09**	**1,35**	**46,60**	**48,27**	**5,13**	**100**
Arad	*64620*	*15500*	*4573*	*222*	*1605*	*86520*	*26168*	*6257*	*118945*
Mehedinţi	*1315*	*2577*	*2418*	*22*	*75*	*6407*	*25558*	*19143*	*51108*
Total ha	*721050*	*324970*	*110088*	*5710*	*21525*	*1183343*	*572467*	*135884*	*1891694*
%	**38,12**	**17,18**	**5,82**	**0,30**	**1,14**	**62,56**	**30,26**	**7,18**	**100**
%	*60,94*	*27,46*	*9,30*	*0,48*	*1,82*	*100*			

The research of ecopedological conditions was made according to "Soil Survey Elaboration Methodology " (Vol. I, II, III) developed by ICPA Bucharest in 1987, supplemented by specific elements of Romanian System of Soil Taxonomy (SRTS - 2012).

Analyzes and other determinations were carried out in the research laboratories of the ,, OSPA-USAMVB,, from Timişoara, 119 Calea Aradului Street, LI 1001/11.25.2013, certified laboratory RENAR, according with National Standards and Rules approved by the Romanian Standardization Association .

RESULTS AND DICUSSIONS

Distinct part of the territory of Romania, in terms of geomorphology and soil cover, great physical-geographical entity Banat Plain suffered during three centuries of hydro-pedo-improvement interventions important to its future evolution, is an area of interest for modern soil research major only able to substantiate the appropriate technical and scientific measures for biomass production plant in an optimized dynamic and rigorous requirements related to environmental protection.

The geographical position in the continent and the presence of Carpathian chain in the east make the territory sought to interfere influences geographic Central European, Eastern European and Balkan, resulting in a great diversity of physic-geographical conditions with direct and indirect effects on the genesis and evolution of soils .

The landscape is characterized by great complexity of morphological forms from meadows and ancient deltas (with numerous courses relicts and altitudes of about 86 m) to the plains (overlapping large cones spreader placed on an area subsidence and altitudes of 88-100 m), piedmont plains (with alluvial-proluvial or wind deposits), plains and foothills, high hills, depressions below or intra and mountains with elevations up to 2291 m (Gugu Peak, Godeanu Mountains) with geological structures and developments pedogeographic related genesis in time and space of the western part of the country.

Geologically, the landscape of the area under study rests on a Carpathian foundation, composed of crystalline rocks Paleozoic and Mesozoic steeped in Tortonian, more pronounced in the central and less peripheral fragmented in different directions after a fault system that almost perpendicularly intersect. These fragments have created areas of weakness and thus balance faulted blocks, amplified by a series of tectonic events, determined by the advancement or withdrawal of the maritime domain (Titans) or lake (Pannonian).

Hydrographic network, represented by rivers, lakes and a complex system of canals for drainage and irrigation, organize their basins south of Mures belong to the Danube basin, the tributaries direct Tisa (Aranca, Bega), or of the Danube (Timis, Caras, Nera, Cerna) and gathers waters exclusively the province. By its geographical position considered territory is characterized by a moderate continental climate with oceanic and Mediterranean influences.

Relief layout in stepps determines the distribution of the vertical and horizontal of all elements of the environment, reflected in the distribution of the natural setting of vegetation: areas of low plain of south-western territory distinguished steppe grasslands, followed by the forests, plains, hills and mountain forests of oaks, beech and coniferous and subalpine meadows on mountain peaks and alpine.

As a result of interaction of pedogenetical factors, resulted a large population of soils having specific characteristics, evolving, related or distinct in their properties differ, productive capacity and measures to preserve and enhance fertility.

According to Romanian Soil Taxonomy System (SRTS-2012) identified 23 types (tab.2) and associations of soils (Fig. 1), including 11 of the 12 soil classes (tab.2, Figure 1), with separate 107 subtypes and 300 ground units and many detailed units.

Agricultural production is carried out under various conditions: natural ecosystems or modified anthropic, intensive or extensive crops under the influence of several factors and environmental conditions changed in time and space of human intervention required with an urgent need, thorough understanding all determinants in terms of their productive capacity, for which each of the two ground units and land (TEO) were defined according to current methodologies Development of Soil Survey, using 23 indicators of evaluation, indicators that represent characters and traits, may important, significant, precise and measurable, which are usually the work of pedological mapping, developed after 1987 by territorial OSPA under methodological guidance of ICPA Bucharest.

Starting from the crowds of possible values of each of the 23 indicators and interactions between these values characterize the qualities of natural and anthropogenically induced each of the 300 TEO's , were made solvency notes for each soil type (identified and characterized) both for the main crops and to use categories.

Table 2

The main types of soil in Banat (Ro)

No. crt	Tip/subtip SRTS-2012	Type/sub- type WRB-1998	Arable	Pasture	Hayfield	Vineyard	Orchard	Agricultural	Forest
			Ha/%	Ha/ %	Ha/ %	Ha/ %	Ha/ %	Ha/ %	Ha/ %
			72	20668	11636	-	32	32408	1947
1	Litosol	Leptosol	0,01	6,36	10,57	-	0,15	2,74	0,34
			-	44358	6121	82	1974	52535	4465
2	Regosol	Regosol	-	13,65	5,56	1,44	9,17	4,44	0,78
			1154	195	11	9	6	1375	687
3	Psamosol	Arenosol	0,16	0,06	0,01	0,15	0,03	0,12	0,12
			68500	20766	11537	67	321	101191	11220
4	Aluviosol	Fluvisol	9,50	6,39	10,48	1,17	1,49	8,55	1,96
			155026	6629	1343	517	635	164150	744
5	Cernoziom	Chernozem	21,50	2,04	1,22	9,05	2,95	13,87	0,13
			38216	650	1365	199	745	41175	573
6	Faeoziom	Phaeozem	5,30	0,20	1,24	3,50	3,46	3,48	0,10
			-	1820	892		258	2970	7671
7	Rendzină	Rendzic Leptosol	-	0,56	0,81	-	1,20	0,25	1,34
			-	2600				2600	973
8	Nigrosol	Humic Umbrisols	-	0,80	-	-	-	0,22	0,17
			-	2405				2405	1030
9	Humosiosol	Cambic Umbrisols	-	0,74	-	-	-	0,20	0,18
			73979	39257	17460	211	1427	132334	197043
10	Eutricambosol	Eutric Cambisol	10,26	12,08	15,86	3,69	6,63	11,18	34,42
			54800	67853	23240		413	146306	49461
11	Districambosol	Dystric Cambisol	7,60	20,88	21,11	-	1,92	12,36	8,64
			130654	12284	2477	1786	4566	151767	90908
12	Preluvosol	Halpic Luvisols	18,12	3,78	2,25	31,28	21,21	12,82	15,88
			110321	31847	9886	154	4766	156974	163668
13	Luvosol	Albic Luvisols	15,30	9,80	8,98	2,70	22,14	13,27	28,59
			3605	1202	231	20	187	5245	-
14	Planosol	Planosols	0,50	0,37	0,21	0,35	0,87	0,44	-
			793	1754	-	-	-	2547	859
15	Prepodzol	Cambic Podzols	0,11	0,54	-	-	-	0,22	0,15
			2163	2210	-	-	-	4373	5667
16	Podzol	Halpic Podzols	0,30	0,68	-	-	-	0,37	0,99
			58117	32498	3765	23	480	94883	9675
17	Vertisol	Vertisols	8,06	10,00	3,42	0,40	2,23	8,02	1,69
			8076	16703	15985	-	-	40764	4294
18	Gleiosol	Gleysols	1,12	5,14	14,52	-	-	3,45	0,75
			3533	3249	2697			9479	10190
19	Stagnosol	Stagnosols	0,49	1,00	2,45	-	-	0,80	1,78
			7355	12772	936			21063	-
20	Soloneț	Solonetz	1,02	3,93	0,85	-	-	1,78	-
			-	390		-	-	390	-
21	Histosol	Histosols	-	0,12	-	-	-	0,03	-
			3677	1690	121	2625	5588	13701	-
22	Antrosol	Anthrosols	0,51	0,52	0,11	45,97	25,96	1,16	-
			1009	1170	385	17	127	2708	11392
23	Tehnosol	Technosols	0,14	0,36	0,35	0,30	0,59	0,23	1,99
			721050	324970	110088	5710	21525	1183343	*572467*
Total			100,00	100,00	100,00	100,00	100,00	100,00	

Figure 1. The main soil types and associations in Banat (adaptation after Țărău, 1998)

Evaluation notes have a certain physical value that has a meaning distinct for each crop the purposes of determining suitability differentiated and the possibility of obtaining with differentiated levels of crops.

Using the rating marks obtained in this way, the lands from the researched area can be grouped, on an interval from 20 to 20 points, in the favorability classes (tab.3., figure 3).

Table 3

Distribution of agricultural land on favorability classes

Culture	Class I		Class II		Class III		Class IV		Class V		Total ha	Average mark
	ha	%	ha	%	ha	%	ha	%	ha	%		
Wheat	37241	17.74	28571	13.61	57100	27.2	46037	21.93	40977	19.52	209925	52
Bailey	35786	17.39	26484	12.87	49779	24.19	51898	25.22	41836	20.33	205783	50
Maize	53687	21.3	30120	11.95	46277	18.36	58602	23.25	63366	25.14	252052	50
Sun -flower	40412	18.48	25214	11.53	40281	18.42	52637	24.07	60138	27.5	218682	47
Potato	5536	6.84	10360	12.8	13550	16.74	18107	22.37	33388	41.25	80941	38
Beet	38043	17.93	24294	11.45	39676	18.7	45002	21.21	65158	30.71	212173	47
Soia	34279	17.02	23947	11.89	38831	19.28	51822	25.73	52526	26.08	201405	47
Beans	35951	17.43	24586	11.92	40591	19.68	53421	25.9	51709	25.07	206257	50

Also under evaluation notes for the fruit trees, the farmland was classified by their group of 20 to 20 points of evaluation in favorability classes (Table 4).

Table 4

Classes of favorability for the main tree species

Culture	Class I		Class II		Class III		Class IV		Class V		Total ha	Average mark
	ha	%	ha	%	ha	%	ha	%	ha	%		
Apple	176555	14.92	141054	11.92	240100	20.29	304711	25.75	320923	27.12	1183343	47
Pear	171111	14.46	178921	15.12	222587	18.81	257377	21.75	353346	29.86	1183343	47
Plum	262347	22.17	184365	15.58	278204	23.51	210635	17.8	224125	18.94	1183343	55
Cherry	180578	15.26	161881	13.68	220457	18.63	313586	26.5	306841	25.93	1183343	47
Apricot	149101	12.6	162000	13.69	216197	18.27	221522	18.72	434524	36.72	1183343	43
Peach	142711	12.06	141409	11.95	217498	18.38	250514	21.17	431565	36.47	1183343	42

CONCLUSIONS

The specific physic- geographicconditions for researched area caused the formation of soils with characteristics very different, from the sandy to very clay, from soda to the strongly acid soils, poor in humus and other nutrients to the soil well balanced in all aspects, for which enable the development of sectors (vegetable, fruit growing, fishing) complémentaire and not competitive with EU activities.

Mapping soil and agrochemical systematic soil studies, conducted by the Soil Survey and Agrochemical from our country provides valuable data on the advancement of the quality of soils, establishing and applying differentiated culture technologies, lands evaluation marks and establish suitability for various crops, substantiating land reclamation works and reclamation technologies, organization and land planning etc.

Given these issues and considering that the main parameter in the act of estimating future production, eco-pedological value played as evaluation notes that can be used to zoning, microzoning and contouring land, follows it presents that considerable economic and social importance both for big farm and for small producer, but especially for central and local public administration in the foundation and development of the programs and PNDL and RDP in the territorial administrative units.

This is a valuable tool for creating the most appropriate practical steps for producing plant biomass in a rigorous dynamic correlated with ever-increasing environmental requirements on environmental protection for the benefit of man, for improving the living conditions of the entire community.

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