QUALITATIVE ASSESSMENT OF SOIL AND LAND RESOURCES FROM MURES-BEGA INTERFLUVE AND THEIR SUITABILITY FOR THE MAIN AGRICULTURAL USE

D. ȚĂRĂU[1(3)], Gh. ROGOBETE[2], V. TABĂRĂ [1], D. DICU[1(3)], A. ȚĂRĂU [1]

[1] Banat`s University of Agricultural Sciences and Veterinary Medicine from Timisoara
[2] Politehnica University of Timisoara
[3] Office of Pedological and Agrochemical Studies Timisoara
dorintarau@yahoo.com

Abstract:*Agricultural production is carried out under various conditions, under the influence of several factors and environmental conditions, change in time and space by human intervention, requires thorough understanding of all determinants in terms of their productive capacity in order to choose the most appropriate uses for a rational management of environmental resources. The assessment of productive capacity and choosing the most appropriate way to use the land, based on a scientific basis in relation to the degree of suitability, help increase productivity and conservation, and therefore increases the resilience of the most sensitive and fragile soils and therefore keeping renewable natural resources quality condition.The aim of the research undertaken is to gather, process and interpret information for evaluating the quality of soil and edaphic cover and its origins in current scientific and practical preoccupations increasingly hard to identify and put in place an integrated management of agro-ecosystems, effective from agronomic points of view, environmental and soil conservation. The subject is the land situated between Mures (north) Lipova Hills (east) Bega canal (south) state border with Serbia (to the southwest) and Hungary (north-west) or soils identified in that the perimeter. These soils were investigated in relation to environmental factors, which determines existence, together forming homogeneous ecological land unit with specific suitability or suitability, with different technological requirements, work that and- proposes this fits into the current concerns of agricultural research and practice internationally and nationally for the study of relations between ecopedological conditions and productivity of agricultural land.*

Key words: assesment, soil, suitability, agriculture

INTRODUCTION

To determine the complex relationships established between different soil properties were taken, both in our country and in the world, numerous studies that have elucidated a number of mutual causality thus serving to define soil taxa, both in terms of genetic, and the fundamental characteristics differentiated with respect to their contribution to the productivity of land and their suitability for plants (BORZA I. ,1997, CANARACHE A., 1980, DUMITRU ȘI COL.,2002, ROGOBETE GH.1997, TEACI D.,1960,1970, 1980 ȚĂRĂU D. 2003, etc).

Between these features and geomorphological, hydrological characteristics are established interrelations determinants for the crops, to the extent possible given the climatic potential of different climatic zones (TEACI, 1980). Knowledge of these peculiarities of soil has great theoretical and practical importance.

For this purpose, the Romanian evaluation methodology of agricultural land which is a mathematical model encompassing synthesis heuristic knowledge in the field of evaluation of the different schools and local experience (D. TEACI 1970,1980, ICPA Bucharest 1987) defines land in environmental terms in relation to atmospheric, cosmic-and technical-edaphic factors.

The basic principle of the methodology of evaluation is developed in our country then for each unit of homogeneous ecological area (TEO) within a cadastral parcels defined under the current methodology to elaborate soil studies using the 23 indicators of evaluation,

indicators character and qualities are most important, more meaningful, more precise and measurable, which are usually found in the studies of pedological mapping, developed after 1987 by territorial OSPA, under methodological guidance of ICPA Bucharest, sets a certain value through evaluation marks.

Evaluation, as part of the assessment of soil resources and land, that side is quantitative but also qualitative in that land, a farm can be differentiated from other surfaces with the same destination, by points awarded (from 1-100) by an index of evaluation techniques and notes as a unique methodology in the country.

Given these considerations, the authors of this paper tries to present some aspects regarding the use of soil information in quality assessment of agricultural lands from Mureş-Bega interfluve, information gathered in soil studies and 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 issue addressed concerns a total area of 397927 ha (207087 ha in low plain and 190840 ha in the high plain) of which 359722 ha (196054 ha in the low plains and 163668 ha in the high plain) agricultural land (Table 1, tab. 2).

Table 1

Structure of the main categories of use (UAT Low plain)

Crt. no.	UAT	Arable	Pasture	Hayfield	Vineyards	Orchards	Total agricultural	Forest	Waters	Other	Total
1	Beba Veche	7793	976	3	16	30	8818	4	216	367	9405
2	Becicherecu Mic	3421	504	383	1	1	4310	2	135	218	4665
3	Biled -Şandra	8853	972	16	3	11	9845	0	242	605	10692
4	Cărpiniş-Iecea	7022	343	0	20	14	7399	2	160	524	8085
5	Cenad	6504	728	43	14	104	7383	366	242	500	8491
6	Cenei -Checea	10178	1304	154	11	7	11644	14	227	646	12531
7	Comloşu M.	8203	495	3	18	5	8724	8	182	565	9479
8	Dudeştii V.	16257	2715	36	40	14	19062	18	564	920	20564
9	Jimbolia	8990	725	12	9	9	9745	6	234	876	10861
10	Lenauheim	10087	404	17	12	0	10520	2	166	587	11275
11	Lovrin	11339	138	6	13	223	11719	34	79	802	12634
12	Periam	7653	749	37	4	600	9043	74	144	572	9833
13	Sânnicolau M	10668	1607	47	12	355	12689	36	320	858	13903
14	Sâmpertu M	15539	3084	154	8	11	18796	201	561	848	20406
15	Sânmihaiu R	5344	1137	362	4	4	6851	10	225	440	7526
16	*Sânandrei*	*6783*	*1539*	*206*	*1*	*5*	*8534*	23	171	512	*9240*
17	Săcălaz	9347	1282	187	4	7	10827	1	356	765	11949
18	Timişoara	7060	426	224	39	84	7833	649	318	4127	12927
19	Teremia M.	6641	625	28	453	2	7749	8	141	468	8366
	Timiş County	*167682*	*19753*	*1918*	*662*	*1476*	*191491*	*1458*	*4683*	*1200*	*198832*
20	Felnac	599	58	4	3	1	665	429	96	320	1510
21	Frumuşeni	3525	250	123	0	0	3898	1601	428	818	6745
	Arad County	*4124*	*308*	*127*	*3*	*1*	*4563*	*2030*	*524*	*1138*	*8255*
	Total Low plain	**171806**	**20061**	**2045**	**665**	**1477**	**196054**	**3488**	**5207**	**2338**	**207087**

Concentrations of population are relatively few (up to colonize the area after peace from Pssarowitz, 1718) the proportion of arable land was used as a lesser being agreed areas for livestock. Larger changes began, as in other regions of the country after 1829, when after the Treaty of Adrianople was liberalized trade in wheat and wood structure of land use is changing fast cutting sharply through forests and space widening grazing and cultivation of cereals.

The samples were investigated in relation to environmental factors, natural or man-made change, which makes the existence, together forming units of homogeneous ecological area (TEO) with the specific suitability or different technological requirements.

Table 2

Structure of the main categories of use (UAT High plain)

Nr.	UAT	Arable	Pasture	Hayfield	Vineyards	Orchards	Total agricultural	Forest	Waters	Other	Total
1	Arad	16942	1901	133	0	0	18976	1146	712	4451	25285
2	Felnac	4012	95	4	3	1	4115	429	96	320	4960
3	Fântânele	3249	296	129	0	0	3674	90	116	304	4184
4	Frumuşeni	3615	269	28	0	0	3912	111	77	215	4315
5	Secusigiu	10060	898	166	0	0	11124	1601	428	818	13971
6	Şagu	8596	786	288	42	0	9711	76	45	434	10266
7	Vinga	10050	603	1037	0	0	11690	101	354	656	12801
8	Zăbrani	6803	1455	221	0	594	9073	1965	184	336	11778
9	Zădăreni	2067	80	24	1	1	2173	80	62	199	2514
	Arad County	**65394**	**6383**	**2030**	**45**	**596**	**74448**	**5599**	**2074**	**7953**	**90074**
10	Biled	8853	972	16	3	1	9845	0	242	605	10692
11	Dudeştii Noi	3705	1124	200	5	0	5034	6	142	211	5393
12	Dumbrăviţa	1311	89	7	1	2	1410	2	42	444	1898
13	Fibiş	3860	669	475	0	54	5058	59	84	118	5319
14	Giarmata	4945	1023	143	184	296	6591	16	87	456	7150
15	Ghiroda	2241	338	18	3	12	2812	5	125	671	3413
16	Maşloc	5167	1120	507	0	163	6957	983	25	316	8281
17	Orţişoara	11633	1560	524	2	74	13793	57	112	601	14563
18	Pişchia	7203	1261	513	285	489	9751	1963	188	459	12361
19	Remetea Mare	7286	1308	200	62	14	8870	875	241	555	10541
20	Satchinez	8027	583	314	2	7	8933	10	482	563	9988
21	Variaş	9485	722	157	1	1	10366	1	148	652	11167
	Timiş County	**73716**	**10769**	**3074**	**548**	**1113**	**89220**	**3977**	**1918**	**5651**	**100766**
	Total High Plain	139110	17152	5104	593	1709	163668	9576	3992	13604	190840
	Low Plain	171806	20061	2045	665	1477	196054	3488	5207	2338	207087
	Total	**310916**	**37213**	**7149**	**1258**	**3186**	**359722**	**13064**	**9199**	**15942**	**397927**

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.

Thus the use of land is dominated by arable land, often occupying proportions of 80% (Şagu 88,51%, Fântânele 88,43%, Beba Veche 88,38% , Orţişoara 84,34% etc), or even more of 90% from agricultural surface (Felnac 97,50%, Zădăreni 95,12%, Comloşu Mare 94,03%, Frumuşeni 92,40%), with a reduction in spontaneous vegetation, biodiversity and balances in agroecosystems (increased attacks by rodents, insects, fungi).

RESULTS AND DISCUSSIONS

By its geographical position, the territory considered, located in the middle of the northern hemisphere between 45° 45' (Ghiroda) - 46° 10' (Aradu Nou) north latitude and 20° 15' (Beba Veche) - 21° 30' (Alios-valley) east longitude, has a great diversity of ecological conditions caused by variability factors (atmospheric and cosmic-telurico-edaphic), which contribute to achieving the environment in which plants grow.

Due to its location, the natural conditions (relief, lithology, hydrology, vegetation) are specific to a interfluve, consists of low-lying plains and high plains (Fig. 1), where they formed and evolved the main soil types, with attributes that reflect their geomorphological, biological, chemical and morphological landscape, the main characteristics defining and determining the growth and fruiting of the main crop.

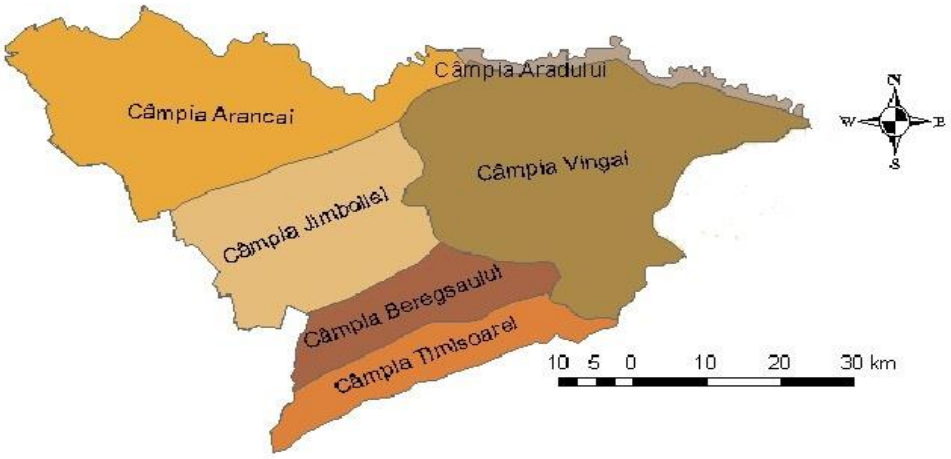

Figure 1. The main forms of relief (adaptation A.Ţărău, 2014, after Gr.Posea, 1997)

Although it is bounded in the north by the current course of Mures, the considered space is part of Bega hydrografical basin, Beregsău subbasin, and most importantly rivers courses are Galaţca and Beregsăul.

Deppending the place of springs in the researched area, where are two types of streams (Ujvari I., 1972):

- originary from other geographical areas : Mureş, Bega and Beregsău
- originary from this geographical area: Măgheruş, Matca, Apa Mare, Ierul, Galaţca and Aranca (all former branches of Mures courses at different levels).

The climate peculiarities are determined by its geographical position, which is specific to a certain movement of air masses of different types, circulation printed either action centers of dynamics origin (Azores and subtropical anticyclone), or centers of thermal action, seasonal (Siberian anticyclone, Asian depression or the Mediterranean depression).

To characterize the specific climatic conditions were used data from two meteorological stations from INMH network (Timisoara and Arad), located at a distance of 60 km and data recorded at the meteorological station at SC-DA Lovrin.

From the phytogeographic point of view, the flora of the investigated area is part of Daco-Illyrian province, Banat Plain District.

So closely interrelated with the variety of geomorphological factors who determining the existence of diversified relief units, those geological which led to a diversity of parental materials (even if it is a small size area, only of 397927 ha) and the climate or the hydrological factors and the various human interventions, have result a large soil population with specific characteristics in continuous evolution.

According to the Romanian System of Soil Taxonomy (SRTS 2012) in the investigated area were identified 13 soil classes, represented by: Fluvisols (5.96%), Chernozeums (46,87%), Phaeozeums (4,84%), Eutric Cambisols (5,75%), Pelosols (3,87%), Vertisols (6,87%), Gleyisols (4,00%), Stagnic Luvisols (3,13%), Solonetzs (1,30%), Anthrosols (2,13%), which differ distinctly from their property, productive capacity and measures of maintaining and increasing fertility.

In this context, the land productivity, as a result of the diversity of physical and geographical conditions and the intrinsic characteristics of soils and anthropogenic interventions occurred over time is much different in space, with large differences between administrative territorial units (ATU), each having surfaces generally in the five quality classes (Table 3-6).

Table 3

Fertility (quality) classes for Arable category of use (ha)

UAT	Agricultural surface	Class I	Class II	Class III	Class IV	Class V	Grade of evaluation
BEBA VECHE	**7793**	803	2092	2120	2680	98	**51**
BECICHERECU Mic+ DUDESTII N.	**7126**	2588	2605	1042	436	455	**69**
BILED+ ŞANDRA	**8853**	4750	3501	520	77	5	**77**
CARPINIS +IECEA	**7022**	4127	2306	84	168	337	**77**
CENAD	**6504**	582	2741	612	2262	307	**52**
CENEI +CHECE	**10178**	1074	2927	2845	3037	295	**54**
COMLOSU MARE	**8203**	3381	2502	1264	870	186	**71**
DUDESTII VECHI	**16257**	634	1828	5974	7270	551	**46**
DUMBRAVITA	**1311**	247	847	137	45	35	**67**
FELNAC	**5725**	0	3041	2504	149	31	**57**
FÂNTANELE	**7127**	0	1144	3483	2309	191	**46**
GHIRODA	**2241**	0	1035	957	229	20	**59**
GIARMATA	**4860**	128	914	2853	849	116	**50**
LENAUHEIM	**10087**	5571	2011	1604	459	442	**72**
LOVRIN	**11339**	5305	4803	154	866	211	**76**
MASLOC +FIBIŞ	**9090**	98	1743	4461	2240	548	**49**
TIMISOARA	**6217**	56	1849	3482	754	76	**55**
JIMBOLIA	**8990**	2497	3650	2038	627	178	**67**
SINNICOLAU MARE	**10668**	480	3497	5281	1060	350	**59**
ORTISOARA	**11633**	1999	5203	3277	594	560	**63**
PERIAM	**7653**	3502	2548	1527	33	43	**74**
PISCHIA	**6676**	157	2977	1800	1389	353	**54**
REMEREA MARE	**7257**	138	2653	3165	946	355	**54**
SACALAZ	**8589**	290	3817	2952	1406	124	**57**
SAGU	**7679**	2441	1876	2008	1278	76	**66**
SINANDREI	**6783**	317	4026	1815	608	17	**64**
SANMIHAIU R.	**5344**	192	1373	1159	2414	206	**46**
SANPETRU MARE	**15539**	3128	4635	5218	1474	1084	**59**
SATCHINEZ	**8027**	4127	2256	664	442	538	**70**
SECUSIGIU	**9949**	4257	2248	1857	1088	499	**65**
TEREMIA MARE	**6641**	185	3813	1171	1030	442	**60**
VARIAS	**9485**	5255	2700	1175	203	152	**74**
TOTAL TIMIŞ COUNTY	**529242**	**62782**	**153054**	**180895**	**103821**	**28690**	**55**

Table 4

Fertility (quality) classes for Pasture category of use (ha)

UAT	Agricultural surface	Class I	Class II	Class III	Class IV	Class V	Grade of evaluation
BEBA VECHE	976	47	247	501	157	24	**54**
BECICHERECU Mic+ DUDESTII N.	2268	167	391	760	626	324	**43**
BILED+ ŞANDRA	958	197	165	288	188	120	**68**
CARPINIS +IECEA	343	51	157	67	34	34	69
CENAD	741	119	130	286	122	84	56
CENEI +CHECE	1305	121	289	597	132	166	56
COMLOSU MARE	495	26	78	235	91	65	43
DUDESTII VECHI	2700	232	930	995	388	155	58
DUMBRAVITA	89	0	51	38	0	0	71
FELNAC	363	3	268	67	25	0	66
FÂNTANELE	337	31	62	194	50	0	57
GHIRODA	338	98	54	62	96	28	**72**
GIARMATA	834	24	29	681	100	0	47
LENAUHEIM	404	68	107	96	84	49	65
LOVRIN	331	58	150	39	45	39	57
MASLOC +FIBIŞ	1844	289	249	938	337	31	56
TIMISOARA	331	85	160	86	0	0	70
JIMBOLIA	725	289	230	146	20	40	72
SINNICOLAU MARE	1112	22	524	482	58	26	58
ORTISOARA	1875	268	411	808	249	139	59
PERIAM	749	96	299	300	33	21	68
PISCHIA	1293	52	261	654	274	52	50
REMEREA MARE	1221	179	204	468	330	40	53
SACALAZ	743	201	393	142	7	0	71
SAGU	786	0	193	393	150	50	48
SINANDREI	1539	295	472	554	132	86	63
SANMIHAIU R.	1137	198	237	490	197	15	54
SANPETRU MARE	3110	96	1458	880	590	86	60
SATCHINEZ	627	27	46	116	162	276	36
SECUSIGIU	898	15	165	523	130	65	46
TEREMIA MARE	1121	221	400	284	118	98	60
VARIAS	735	55	267	141	178	94	62
Total TIMIŞ County	**124461**	**13399**	**32013**	**48752**	**20654**	**9643**	**56**

Table 5

Fertility (quality) classes for Hayfield category of use (ha)

UAT	Agricultural surface	Class I	Class II	Class III	Class IV	Class V	Grade of evaluation
BEBA VECHE	3	0	0	1	2	0	34
BECICHERECU Mic+ DUDESTII N.	627	0	0	82	227	318	25
BILED+ ŞANDRA	16	0	10	6	0	0	60
CARPINIS +IECEA	0	0	0	0	0	0	0
CENAD	43	0	0	21	16	6	**47**
CENEI +CHECE	154	0	3	140	6	5	51
COMLOSU MARE	3	0	0	1	1	1	30
DUDESTII VECHI	36	0	5	18	13	0	46
DUMBRAVITA	7	0	0	5	2	0	52
FELNAC	21	0	9	10	2	0	35
FÂNTANELE	50	12	8	16	10	4	57
GHIRODA	224	1	79	134	2	8	63
GIARMATA	121	0	11	50	60	0	43
LENAUHEIM	16	0	0	2	14	0	35
LOVRIN	17	0	0	10	0	7	33
MASLOC +FIBIŞ	917	22	81	502	294	18	44
TIMISOARA	154	29	96	29	0	0	69
JIMBOLIA	12	0	3	6	3	0	54

SINNICOLAU MARE	43	0	14	22	6	1	52
ORTISOARA	531	1	6	50	247	227	24
PERIAM	37	0	10	27	0	0	56
PISCHIA	585	0	77	286	215	7	45
REMEREA MARE	199	3	31	71	77	17	43
SACALAZ	169	5	42	115	0	7	58
SAGU	288	0	10	20	250	8	27
SINANDREI	206	2	133	45	25	1	64
SANMIHAIU R.	362	0	34	301	23	4	45
SANPETRU MARE	167	0	47	92	22	6	57
SATCHINEZ	346	0	22	87	154	83	35
SECUSIGIU	166	0	10	50	100	6	31
TEREMIA MARE	27	0	4	11	11	1	56
VARIAS	157	0	0	0	7	150	17
Total TIMIŞ County	**29535**	**859**	**5245**	**9472**	**9348**	**4611**	**46**

Table 6

Fertility (quality) classes for Orchards category of use (ha)

UAT	Agricultural surface	Class I	Class II	Class III	Class IV	Class V	Grade of evaluation
BEBA VECHE	30	0	5	0	14	11	31
BECICHERECU Mic+ DUDESTII N.	1	0	0	0	1	0	21
BILED+ ŞANDRA	1	0	0	1	0	0	45
CARPINIS +IECEA	14	0	0	14	0	0	49
CENAD	104	0	7	13	43	41	32
CENEI +CHECE	7	0	0	1	5	1	27
COMLOSU MARE	5	0	1	4	0	0	48
DUDESTII VECHI	13	0	1	0	4	8	23
DUMBRAVITA	2	0	2	0	0	0	64
FELNAC	8	0	1	4	2	1	44
FÂNTANELE	1	0	0	1	0	0	42
GHIRODA	12	0	2	10	0	0	50
GIARMATA	305	0	8	257	22	18	46
LENAUHEIM	1	0	0	0	1	0	28
LOVRIN	223	19	156	5	43	0	59
MASLOC +FIBIŞ	319	0	149	121	42	7	54
TIMISOARA	19	0	2	11	3	3	41
JIMBOLIA	9	0	0	0	9	0	35
SINNICOLAU MARE	344	0	186	75	78	5	51
ORTISOARA	78	0	8	6	29	35	25
PERIAM	591	12	412	102	64	1	62
PISCHIA	466	0	87	230	109	40	46
REMEREA MARE	14	0	1	5	1	7	36
SACALAZ	7	0	0	4	3	0	36
SAGU	0	0	0	0	0	0	/
SINANDREI	5	0	0	0	1	4	11
SANMIHAIU R.	4	0	4	0	0	0	77
SANPETRU MARE	11	0	0	2	8	1	**25**
SATCHINEZ	7	3	0	0	1	3	49
SECUSIGIU	0	0	0	0	0	0	/
TEREMIA MARE	2	0	0	0	0	2	12
VARIAS	1	0	0	0	1	0	32
Total TIMIŞ County	**9119**	**63**	**1755**	**2783**	**3420**	**1098**	**41**

CONCLUSIONS

Knowledge of natural conditions and in particular the ecological potential of land (defined as MESP-ICPA Bucharest, 1987) for the main crops of particular importance in the completion of the main uses of land planning is justify the need to be met the periodicity investigations in field and laboratory after the grid of the National System for monitoring soil-land, at every 8x8 km.

It is required, therefore, supplementing it with soil and agrochemical studies for evaluation marks and qualitative assessment of land degradation processes to identify causes, forecasting and recommend remedial measures.

Due to a good ecological natural potential, the soil quality situation is disappointing, as most of them are affected by the existence of one or more limiting or restricting factors, the area is subject, from the early beginnings of human intervention more intense than in other territories from Timis county.

Given this and considering that the main parameter in the action of estimate the future production, the ecopedological value played as evaluation notes that can be used to zoning the production, with a major economic and social importance, especially for central and local government in the foundation of the PNDL and RDP programs in the territorial administrative units.

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