

RESEARCH ON ECOPEDOLOGICAL BASES OF SOIL PRODUCTIVITY AND ENVIRONMENTAL PROTECTION IN THE LOWER BASIN OF THE MURES RIVER

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Abstract : *The purpose of research is accumulating scientific data on the physical, chemical and microbiological soil characteristics, needed to develop a methodology for assessing the soil quality through a comprehensive approach of physical, geographical, climatical conditions from Aranca Plain. Between soil characteristics and the main cultivated or wild species can establish a diverse and complex relations of reciprocity. Thus soil characteristics can exert an influence on the development of root systems, mineral nutrition, insurance of water and temperature regime for the main physiological processes necessary to carry the plants, in turn acts both directly and indirectly on the state of soil fertility. Research on the main physical and chemical properties of soil were taken by many scientists in this country and abroad since the beginning of last century and the German classification system was designed mainly based on soil texture in phase of its evolution. As part of the soil, clay plays a role in the relations established between certain physical and chemical soil properties and between them and the activities of organisms that inhabit it. The research undertaken in recent years, by this group in collaboration with specialists from the Department of Microbiology, Faculty of Sciences and Informatics, University of Szeged, Hungary, is a test of some aspects of establishing the link between physical-chemical components and microbiological activity for development of methodologies for analyzing soil microbial diversity in relation to its functions and*

quality or soil health. Physico-chemical properties of soil samples (texture, pH, humus and N,P,K content) and biochemical and microbial diversity of the samples were analyzed in the OSPA-USAMVB Timisoara Research Laboratory according with national norms and standards and in the laboratories of the Department of Microbiology, Faculty of Sciences and Informatics, University of Szeged (the microbial activities diversity was evaluated by PCR-based of analysis of rRNA spacer intergenic-RISA). Knowledge of these special features of the soil presents a theoretical and practical importance. Theoretical, because it provides to expert the possibility to interpret the phenomena that occur in soil and to predict soil evolution in particular and environment in terms of present and future health and practicaly because warns as what action should be taken to bring optimum soil conditions for growth and development of plants. The importance, originality and timeliness of the paper is the necessity for protection of soil and environment and objectives of the project CBC HURO Development and evaluation through a comprehensive approach to the chemical - physical - microbiological of soil quality are: the accumulation of scientific data necessary to support the consevative technology of soils and sustainable management of soil and water resources and implementation of the conservative tillages and sustainable management of physical and geographical conditions of the Aranca Plain.

Key words : *biodiversity, cooperation, cohesion, durability, monitoring*

INTRODUCTION

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

Of course knowledge of natural conditions and features of the ecological potential of land area for various utilities and certain cultures have a major economic and social importance for both large farms and small producers.

In this context, the major directions of the Romanian school of pedology (BORZA and al. 2001, COSTE and al.1997, 2003, DUMITRU and al. 2000, FLOREA 1979, 1991, 1994, and al.1981, IANOȘ, 1994, MUNTEANU and al . 1994, 1998, POSEA, 1997, TEACI 1980,1995, ȚĂRĂU and al. 2002) on providing a coherent framework for research on appropriate land requirements of sustainable agriculture and environmental protection, will be solved in order to adjust to the European system, in full accord and harmony with the following specific functions of land: ecological, economic, technical , social and legal.

Given these considerations, the authors of this paper tries to present some aspects concerning the use of soil information in promoting environmentally friendly farming practices, information gained in studies of soil and stored in the OSPA (Timisoara and Arad) territorial archive, in most of the classic support, but based on a computer system SPED (used by OSPA Timisoara from 1988 and OSPA Arad from 2001) and BDUST-system implemented in the area by the ICPA Bucharest.

MATERIAL AND METHODS

The research refers to an area of 111,857.91 ha, of which 99,822.91 ha of agricultural land (Table 1).

Table 1

Surface structure for the main categories of uses (ha)

Crt. No.	Locality	Arable	Pasture	Hayfield	Vineyard	Orchard	Total agricultural	Forest	General Total
1	Beba Veche	7793	976	3	16	30	8818	4	9405
2	Cenad	6504	728	43	4	104	7383	366	8491
3	Dudeștii Vechi	16257	2715	36	40	14	19062	18	20564
4	Lovrin	11339	138	6	13	223	11719	34	12634
5	Periam	7653	749	37	4	600	9043	74	9833
6	Saravale	7377	2138	98	6	1	9620	81	10247
7	Sănnicolau Mare	10668	1608	47	12	356	12690	36	13904
8	Sâmpertu Mare	8162	946	56	2	10	9176	120	10159
9	Teremia Mare	6641	625	28	453	2	7749	8	8366
	Timiș County	82394	10623	354	550	1340	95260	741	103603
1	Felnac	598.59	58	4	3	1	664.59	429	1509.59
2	Secusigiu	3525.32	250	123	0	0	3898.32	1601	6745.32
	Arad County	4123.91	308	127	3	1	4562.91	2030	8254.91
	General Total	86517.91	10931	481	553	1341	99822.91	2771	111857.91

OJCPI Timiș, Arad/ The statistical report on the state land on 31.12.2006.

The research of ecopedological conditions, ordering and data processing was done in accordance with the Developing of Pedological Studies Methodology (vol I, II, III), developed by ICPA Bucharest in 1987 and the Romanian System of Soil Taxonomy (SRTS-2003).

RESULTS AND DISCUSSIONS

Following of its settlement, the natural conditions (relief, lithology, hydrology, vegetation) are specific to a low subsidence and accumulation plain, where they formed and evolved the main soil types which reflect through geological, biological, chemical and

morphological characteristics the main features of their landscape defining and determining the growth and fruition of the main crop.

The area in which the research was made is part of Aranca Plain and Galațca Plain as part of Mures Plain located at south of the current course of Mures.

The geological past of researched area is connected with the past of Banato-Crișana Plain, being one of the east part of the great basin of sedimentation called Panonic Depression.

It sank on alignments of ancient north-south oriented faults, more towards the west and less towards the Carpathians, from Badenian, peaking during the Pannonian, after which it became slower (IANOȘ 1981).

These fragments have created areas of least resistance and the balance of faulted blocks, amplified by a series of tectonic events have led to advances or withdrawal of the marine area (Thetys) or lake area (Pannonian).

The formation phases of Carpatians have differentiate the mouvement of crystalline blocks from foundation of plain, creating periodicaly areas with tendency of dip or inverse, the crystalline blocks from east, generally much raised, situated to 1000 m depth (980 m to Găvojdia, in west and south-west going down to 200 m at Giulvăz-Foeni).

The forming of plains from investigated space is strongly connected to base level of Panonic Depression from Middle Danube area, to varied rivers that comes from mountains, thing that had determinate the evolution of two groups of plains: high plains (situated near hills) and low plains (situated near Tisa).

Low plains starts to an 80 m altitude and are superposed over subsident area of Pannonic Depression, made by under wather evacuation cons, that have been identify under lacustrian sediments, cover with different materials: recent alluvial deposits or eolian deposits.

Lowered altitude and reduced depth of groundwater in the recently alluvium layer explained that the arrangement is not continue, the relief is composed of a series of levees and river-lake depression areas, characteristic of a continental delta (Delta of Mures).

Depending on the north-south variation of morpho-hydrographic conditions, lithology and nature of agents, it can generally be identified several subunits:

Aranca Plain (Felnac-Periam-Valcani), situated between Mureș river and Galațca and it seems like a large depression, is the lowest part of researched area, with 77-83 m altitude, with little depressions and banks with general level bigger with 0,5-1,0 m confronted with general level. Also, there are here and there antropical knolls who are lifting with 3-5 m over general level. Generally, this plain is an low area, with old abandoned flows, with high percent of clay in superficial stratification of soils and extended clayey minerals, place where an important attention have been gived to hidro-improvement works.

Galațca Plain (Pesac-Lovrin-Teremia) is centred on an old bank of Mureș and the main flow of Galațca river, with 100m altitude. This plain is form by dense alluvial deposits and sand deposits, in Teremia Mare area the surface is covered by sand hill and it is fixed with vineyards.

Though is delimited by actual flow of Mureș river, the researched area belong to hydrographical basin Bega, under basin Berecsău, the most importants flows of wather beeying Aranca and Galațca.

Aranca, an old flow of Mureș river, has its springs in watherside of Mureș at Felnac, on 10m under river level and after it crossing our country on 108 Km it pouring in Tisa on Hungary territory. Has an important role in collecting wather on 1016 Km² depressionary surface, with underground wather at 1-2 m and standstill of surface wather. In rainy periods, because wather gates from border, it can not be evacuate all the wather and the land near are inundated.

For the characterisation of climatic conditions we have use the dates from meteorological stations Sânicolau Mare and SC-DA Lovrin.

From the dates of Lovrin we can see that the biggest average of temperature was 12.8 °C in 2006/2007 agricultural year and the smallest average was 9.3 °C in 2004/2005 agricultural year.

The biggest monthly temperature average was recorded in august (30.5 °C) and the smallest was in february (-4.9 °C).

Because of cyclones activities and humid air invasion from west, south-west and north-west, in high plains from the west area of Romania the precipitations are quantitatively bigger than others part of the country (table 3), exception made by north-west part of the plain.

Wind conditions in south-west part of Romania is defined by development of baric systems who interfere above Europe at 45° north latitude (azoric, syberian, scandinavian anticyclone and mediteranean, islandish cyclone).

In the Plain of Mureş we find flora and fauna elements similar to all West Plain, represented by historical province Banat and Crişana, with thermophyte and xerophyte plants, balcanic and central-european ecosystems.

From phito-geografical point of view, the flora of researched area belong to “province daco-ilirica” region, the “Plain of Banat” district (BORZA 1943, BAŞCOIU 1965).

In this context it is necessary to distinguish the importance of wooden species like: *Quercus cerris*, *Quercus fornitto*, *Quercus pubescens*, *Tillia tomentosa*, *Fraxinus ornus*, *Cornus mas*, species that are associated in complex and protect a great number of thermophile grassy species (COSTE, 2003).

As a result of geographical position, at the interference of low plains and hills, in the old delta of Mureş, the studied territory present various geological and phisical-geographical conditions, matter that have condition the forming of a complex cover of soils.

So, in pressed correlation with the variety of geomorphological factors that cause the existence of a diverse types of relief units, of geological factors that have guide to a diversity of materials (even for a reduced territory, of 111.857,91 ha) and of climatic or hydrological factors, with antropical interventions, have result a varied population of soils with specific characteristics (related or totally different) in permanent evolution.

According with Romanian Taxonomic System of Soils (SRTS 2003) and WRB for SR 1998, in researched area have been identified 6 classes, 8 types, 35 undertypes, 98 varieties and other units, which are different through their propertys, their productiv capacity and measures for maintainance and increase their fertility. So, the map of soils include types and subtypes of soil, on a surface of 99.822,91 ha, that represents 100% of researched area:

- Arenosols (mollic, gleyed, sodic), 5 TEO (1-5), 467,10 ha, 0,47%.
- Fluviosols (mollic, gleyed, salic,sodic), 19 TEO (6-24), 10328,50 ha, 10,35%
- Chernozems (gleyed, salic,sodic, vertic), 58 TEO (25-82), 60279,89 ha, 60,38%
- Cambisols (mollic, gleyed, salic, vertic), 23 TEO (83-105), 5319,06 ha, 5,33%
- Pelosols (gleyed), 9 TEO (106-114), 8785,02 ha, 8,80%
- Vertosols (gleyed, salic,sodic), 7 TEO (115-121), 8801,94 ha, 8,82%
- Gleysols (mollic, pelic, sodic, salic), 11 TEO (122-132), 3897,30 ha, 3,90%
- Solonetz (mollic, gleyed), 4 TEO (133-136), 1944,10 ha, 1,95%

Crop production can be done in the different conditions: natural ecosystems or agro-ecosystems, extensive or intensive requires with a pressing necessity as deep knowledge of all ecological determinants, for which each of the 136 units of land (TEO) identified were characterized under the current methodology of the soil studies using the 23 indicators of evaluation (Table 2).

This indicators are represented by indicator 3C–medium temperature, 4C-yearly precipitation, 14-gleysation degree, 15-stagno-gleysation degree, 16-salty degree, 17-alkalization, 23A-texture in worked layer, 23B- texture in first 200 cm, 29-soil pollution, 33-terrain slope, 34-land exhibition, 38-land slope, 39-pedofreatic water level, 40-land inundability, 44-classes of total porosity, bulk density and compaction degree, 50- permeability classes, 61-CaCO₃ content, 63-soil reaction , 69-classes of base saturation , 133-Volume edaphic classes, 144-humus reserve classes, 181-surface moisture excess, 271-land improvement, character and traits most important, more significant, specific and measurable, which is usually found in pedological mapping work, prepared after 1987 by territorial OSPA, under methodological guidance of ICPA Bucharest.

Choosing the appropriate technology of exploitation, conservation and cultural improvement in the current real productivity growth implies a detailed knowledge of all ecological determinants.

Among the soil factors and conditions were plants grow and yield crops, the soil is a major component, which acts on the one hand, the composite indicator of the state of evolution of traits that determine plant growth and on the other hand, the depository of the influence of all other conditions and factors that have been recorded accurately and continuously, all the phenomena occurring in a particular place and time, the soil can thus be considered soil can thus be regarded as a fair and accurate tool for multi-sensorial and at the same time as a computer with a large memory that can be integrated to find out what happened and what can happen there.

As a natural feature with high stability, the composition size or soil texture has a significant role in achieving its production capacity.

Defined by the proportion of mineral particles of different sizes, size composition of the soil profile is determined by the texture and the nature of parent material and type and intensity of pedogenesis processes of their manifestations.

Textural groups of classes and subclasses are determined by the extent to which participating parties of different sizes (sand, dust, clay) the composition of the soil profile, the number and the name differs from author to author, in fact some conventional categories.

The soil texture of researched area is an coarse texture on 350,3 ha (0,36%), a medium texture on 46549,25 ha (46,68%) and a fine texture on 52868,16 ha (52,96%).

Soil organic matter plays an important role in soil carbon cycle, soil health is determined by the balance between macro-and micro-organisms, their qualitative and quantitative analysis is needed to implement sustainable agricultural practices (low input), protection ground effects and mitigation.

The humus reserve in the first 50 cm is very small on 4503,02 ha (4,31%), small on 8438,42 ha (8,35%), middle on 16980,26 ha (17,01%), big on 14148,50ha (14,47%), and very big on 55752,71 (55,86%).

Based on these characteristics were identified limiting factors influencing the quality of the soil cover, respectively: groundwater moisture excess (strong 18%, very strong 7%), rainfall excess moisture (average 38%, strong 8%, very strong 18 %), increased compactness (moderate 27%, strong and very strong 24%), salty (moderate and strong 16%), humus reserve (less 13%, middle 30%).

In order to eliminate or reduce these limitations are necessary works to prevent groundwater and rainfall excess moisture (cultural work performed under optimal conditions of humidity, proper structure and plant crops that include improving, etc) on 64% of the surface, land reclamation aimed at improving the soil with salt or excess humidity on 28%, smoothing and capital shaping around the 8.8%, remediation and maintenance of existing drainage system.

Table 2

Legend of soil and land units and coded values of the main indicators of ecopedological characterizing

Nr nou	Tip, subtip, varietate	3C	4C	14	15	16	17	23A	23B	29	33	34	38	39	40	44	50	61	63	69	133	144	181	271
1	PS ti 22/22	10.5	650	0	0	0	0	22	22	2	1	0	0	2	0	5	65	0	6.6	79	175	45	1	30
2	PS gc G4 22/22	10.5	750	4	0	0	0	22	22	2	1	0	0	0.7	0	5	65	0	7.5	96	175	45	1	30
3	PS mo 22/22	10.5	575	0	0	0	0	22	22	2	1	0	0	7	0	15	5	1	6.6	87	175	225	1	20
4	PS mo-gc G3 32/52	10.5	575	3	0	0	0	22	32	2	1	0	0	2	2	-5	5	3	8.1	96	175	140	1	0
5	PS sc-ac 22/22	10.5	575	0	0	22	32	22	22	2	1	0	0	1.4	0	15	5	3	8.1	96	175	140	1	20
6	AS en 32/32	10.5	650	0	0	0	0	32	32	2	1	0	0	3.5	2	15	20	0	6.1	87	138	45	1	30
7	AS en 42/32	10.5	650	0	0	0	0	42	32	2	1	0	0	3.5	2	15	20	0	6.1	87	138	45	1	30
8	AS en-gc G3 42/42	10.5	650	3	0	0	0	42	42	2	1	0	0	1.4	2	15	20	0	6.6	87	88	45	1	30
9	AS ti 32/32	10.5	650	0	0	0	0	32	32	2	1	0	0	3.5	0	-15	5	0	6.1	79	175	90	1	30
10	AS ti G2 32/32	10.5	650	2	0	0	0	32	32	2	1	0	0	2	0	-15	5	0	6.6	79	175	90	1	30
11	AS ti G2 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	-5	1	0	6.6	79	175	140	1	30
12	AS ti G2 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	5	1	0	6.1	79	175	140	2	30
13	AS sc G2 52/52	10.5	575	2	0	32	11	52	52	2	1	0	0	1.4	0	15	1	3	7.5	98	175	180	1	30
14	AS gc G3 32/32	10.5	650	3	0	0	0	32	32	2	1	0	0	2	0	-15	20	0	6.6	79	175	90	1	30
15	AS gc G3 42/52	10.5	650	3	0	0	0	42	52	2	1	0	0	2	0	5	1	0	7	87	175	140	1	30
16	AS gc G4 42/32	10.5	650	4	0	0	0	42	32	2	1	0	0	1.4	0	5	20	3	8.1	96	175	140	4	20
17	AS gc G4 52/52	10.5	750	4	0	0	0	52	52	2	1	0	0	1.4	0	5	1	0	7	87	175	140	3	30
18	AS mo G2 52/52	10.5	575	2	0	0	0	52	52	2	1	0	0	2	2	15	1	6	7	96	175	140	2	20
19	AS pe-gc G5 52/52	10.5	750	5	0	0	0	52	52	2	1	0	0	0.7	2	15	0.4	0	5.6	79	175	140	3	20
20	AS mo-gc G3 42/42	10.5	650	3	0	0	0	42	42	2	1	0	0	2	0	-5	5	0	7.5	87	175	180	1	30
21	AS mo-gc G3 32/61	10.5	650	3	0	0	0	32	61	2	1	0	0	1.4	2	-15	1	3	7.5	96	175	180	2	0
22	AS sc-gc G4 S23 42/42	10.5	650	4	0	23	0	42	42	2	1	0	0	1.4	2	5	5	3	8.1	96	175	140	3	20
23	AS ss G2 S23 A41 42/52	10.5	650	2	0	23	41	42	52	2	1	0	0	2	2	15	1	0	6.1	87	175	140	1	20
24	AS sc-ac G2 S23 A41 42/52	10.5	750	2	0	23	41	42	52	2	1	0	0	2	0	25	1	6	8.7	96	175	90	3	30
25	CZ ti G1 k1 32/32	10.5	650	1	0	0	0	32	32	2	1	0	0	3.5	0	-5	20	10	7.5	96	175	180	1	30
26	CZ ti G1 k1 42/42	10.5	650	1	0	0	0	42	42	2	1	0	0	3.5	0	-5	5	10	7.5	96	175	225	1	30
27	CZ ti G1 k1 52/42	10.5	650	1	0	0	0	52	42	2	1	0	0	3.5	0	5	1	10	7.5	96	175	225	2	30
28	CZ ti G1 k1 52/52	10.5	650	1	0	0	0	52	52	2	1	0	0	3.5	0	5	1	10	7.5	96	175	225	2	30
29	CZ ti G1 42/42	10.5	650	1	0	0	0	42	42	2	1	0	0	3.5	0	-5	5	6	7	96	175	225	1	30
30	CZ ti G1 k2 52/52	10.5	650	1	0	0	0	52	52	2	1	0	0	3.5	0	5	1	6	7	96	175	225	2	30
31	CZ ti G1 k2 A11 42/41	10.5	650	1	0	0	11	42	41	2	1	0	0	3.5	0	5	1	10	7.5	96	175	225	2	30
32	CZ ti G2 k1 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	-5	5	10	7.5	96	175	225	1	30
33	CZ ti G2 k1 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	5	1	10	7.5	96	175	225	2	30
34	CZ ti G2 k2 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	-5	5	6	7	96	175	225	1	30
35	CZ ti G2 k2 52/42	10.5	650	2	0	0	0	52	42	2	1	0	0	2	0	-5	1	6	7	96	175	225	2	30
36	CZ ti G2 k2 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	5	1	6	7	96	175	225	2	30
37	CZ ti G2 k2 A11 42/42	10.5	650	2	0	0	11	42	42	2	1	0	0	2	0	-5	5	10	7.5	96	175	225	1	30
38	CZ sc G2 k2 S22 32/32	11.5	575	2	0	0	22	32	32	2	1	0	0	2	0	-5	20	1	8.1	96	175	225	1	20
39	CZ ti G2 K2 S11 52/52	10.5	650	2	0	11	0	52	52	2	1	0	0	2	0	5	1	10	7.5	96	175	225	2	30
40	CZ gc G3 k242/42	10.5	650	3	0	0	0	42	42	2	1	0	0	1.4	0	5	5	10	7.5	96	175	225	2	30
41	CZ gc G3 k2 52/52	10.5	750	3	0	0	0	52	52	2	1	0	0	1.4	0	5	1	10	7.5	96	175	225	3	30
42	CZ gc G3 k2 52/52	10.5	650	3	0	0	0	52	52	2	1	0	0	1.4	0	5	1	6	7.5	96	175	225	3	30
43	CZ gc G3 k2 S11 42/42	10.5	750	3	0	11	0	42	42	2	1	0	0	1.4	0	-5	5	10	7.5	96	175	225	2	30
44	CZ gc G3 k1 S11 52/52	10.5	650	3	0	0	11	52	52	2	1	0	0	1.4	0	5	1	10	7.5	96	175	225	3	30
45	CZ gc G3 k1 S11 52/52	10.5	750	3	0	0	11	52	52	2	1	0	0	1.4	0	15	1	10	7.5	96	175	225	4	30
46	CZ gc G4 52/52	10.5	750	4	0	0	0	52	52	2	1	0	0	1.4	0	15	1	6	7.5	96	175	225	4	30
47	CZ sc G2 k S23 42/42	10.5	650	2	0	23	0	42	42	2	1	0	0	2	0	5	5	6	8.1	96	175	225	1	30
48	CZ ac G2 k A23 42/42	10.5	650	2	0	0	23	42	42	2	1	0	0	2	0	5	5	6	8.1	96	175	225	1	30
49	CZ gc-ac G3 k A23 42/42	10.5	650	3	0	0	23	42	42	2	1	0	0	2	0	5	5	6	8.1	96	175	225	1	30
50	CZ gc-ac G3 k A23 52/52	10.5	650	3	0	0	23	52	52	2	1	0	0	1.4	0	15	1	6	7.5	96	175	225	3	30
51	CZ gc-ac G4 A23 42/42	10.5	750	4	0	0	23	42	42	2	1	0	0	1.4	0	5	5	6	8.1	96	175	180	4	30
52	CZ gc-ac G4 kA23 52/52	10.5	650	4	0	0	23	52	52	2	1	0	0	1.4	0	15	1	6	7.5	96	175	180	3	30
53	CZ gc-ac G3 kA32 42/42	10.5	650	3	0	0	32	42	42	2	1	0	0	2	0	15	1	6	8.7	96	175	180	2	30
54	CZ gc-ac G4 k A33 52/52	10.5	650	4	0	0	33	52	52	2	1	0	0	1.4	0	25	0.4	3	8.7	96	175	180	4	30
55	CZ ss-ac G2 S22 A25 42/42	11.5	525	2	0	22	25	42	42	2	1	0	0	3.5	0	-5	20	14	8.1	96	175	225	1	20
56	CZ sc-ac G2 k S23 A23 52/52	10.5	650	2	0	23	23	52	52	2	1	0	0	2	0	15	1	3	8.1	96	175	225	2	30
57	CZ sc-ac G3 k S23 A23 52/52	10.5	650	3	0	23	23	52	52	2	1	0	0	2	0	15	1	3	8.1	96	175	225	2	30
58	CZ sc-ac G3 k S22 A32 52/52	10.5	650	3	0	22	32	52	52	2	1	0	0	2	0	25	0.4	3	8.7	96	175	180	3	30
59	CZ cb G1 k3 32/32	10.5	650	1	0	0	0	32	32	2	1	0	0	3.5	0	5	5	0	6.1	87	175	180	1	30
60	CZ cb G1 k3 42/42	10.5	650	1	0	0	0	42	42	2	1	0	0	3.5	0	5	5	0	6.1	87	175	225	1	30
61	CZ cb G1 k3 52/52	10.5	650	1	0	0	0	52	52	2	1	0	0	3.5	0	15	1	0	6.1	87	175	225	2	30
62	CZ cb G1 k3 52/52	10.5	750	1	0	0	0	52	52	2	1	0	0	3.5	0	15	0.4	0	6.1	79	175	225	4	30
63	CZ cb G2 k3 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	5	5	0	6.6	87	175	225	1	30
64	CZ cb G2 k3 42/42	10.5	750	2	0	0	0	42	42	2	1	0	0	2	0	5	1	0	6.6	79	175	225	3	30
65	CZ cb G2 k3 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	15	1	0	6.6	87	175	225		

Nr nou	Tip, subtip, varietate	3C	4C	14	15	16	17	23A	23B	29	33	34	38	39	40	44	50	61	63	69	133	144	181	271
69	CZ cb-gc G3 k3 52/52	10.5	650	3	0	0	0	52	52	2	1	0	0	1.4	0	15	1	0	6.6	87	175	225	2	30
70	CZ cb-gc G3 k 52/52	10.5	750	3	0	0	0	52	52	2	1	0	0	1.4	0	15	0.4	0	6.6	79	175	225	4	30
71	CZ cb-gc G4 k 52/52	10.5	750	4	0	0	0	52	52	2	1	0	0	1.4	0	5	0.4	0	6.6	87	175	225	4	30
72	CZ gc G3 42/42	10.5	525	3	0	0	12	42	42	2	1	0	0	2	0	-5	5	6	7.5	96	175	275	1	20
73	CZ gc G3 52/52	10.5	525	3	0	0	0	52	52	2	1	0	0	2	0	5	5	6	8.1	96	175	180	1	20
74	CZ cb-gc-sc G4 k3 S23 52/52	10.5	750	4	0	23	0	52	52	2	1	0	0	1.4	0	5	0.4	0	6.6	87	175	225	4	30
75	CZ cb-ac G2 k3A23 42/42	10.5	650	2	0	0	23	42	42	2	1	0	0	2	0	15	5	0	6.6	87	175	225	1	30
76	CZ cb-ac G2 k3 A23 52/52	10.5	650	2	0	0	23	52	52	2	1	0	0	2	0	15	1	0	6.6	87	175	225	2	30
77	CZ cb-gc-ac G3k3 A23 42/52	10.5	750	2	0	0	23	42	52	2	1	0	0	1.4	0	15	5	0	6.6	87	175	225	3	30
78	CZ cb-gc-ac G3 k3A23 52/52	10.5	650	2	0	0	23	52	52	2	1	0	0	1.4	0	15	5	0	6.6	87	175	225	2	30
79	CZ cb-gc-ac G4 k3 A23 52/52	10.5	650	4	0	0	23	52	52	2	1	0	0	1.4	0	15	1	0	6.6	87	175	225	2	30
80	CZ cb-gc-ac G3 k3 A32 42/42	10.5	750	3	0	0	32	42	42	2	1	0	0	1.4	0	25	1	0	6.6	87	175	180	3	30
81	CZ cb-gc-ac G3 A32 52/52	10.5	650	3	0	0	32	52	52	2	1	0	0	1.4	0	15	1	0	6.6	87	175	275	2	30
82	CZ ss G2 A23 32/42	10.5	575	2	0	23	23	32	42	2	1	0	0	1.4	0	25	1	1	7.5	96	175	180	1	30
83	EC ti G1 42/42	10.5	650	1	0	0	0	42	42	2	1	0	0	3.5	0	5	5	0	6.1	79	138	140	1	0
84	Ec ti G1 42/42	10.5	650	1	0	0	0	42	42	2	1	0	0	3.5	0	5	5	0	6.6	79	175	180	1	30
85	EC ti G2 32/32	10.5	650	2	0	0	0	32	32	2	1	0	0	2	0	5	5	0	6.1	79	175	90	1	30
86	EC ti G2 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	5	5	0	6.1	79	175	140	1	30
87	EC ti G2 42/52	10.5	650	2	0	0	0	42	52	2	1	0	0	2	0	15	1	0	6.6	79	175	140	1	30
88	EC ti G2 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	15	1	0	6.6	79	175	140	1	30
89	EC gc G3 42/42	10.5	650	3	0	0	0	42	42	2	1	0	0	2	0	5	5	0	6.1	79	175	140	1	30
90	Ec gc G3 42/52	10.5	650	3	0	0	0	42	52	2	1	0	0	2	0	15	1	0	6.1	79	175	140	2	30
91	EC gc G4 42/42	10.5	750	4	0	0	0	42	42	2	1	0	0	1.4	0	5	1	0	6.1	79	175	140	4	30
92	EC gc G4 42/52	10.5	750	4	0	0	0	42	52	2	1	0	0	1.4	0	15	0.4	0	5.6	65	175	140	5	30
93	EC gc G4 52/52	10.5	750	4	0	0	0	52	52	2	1	0	0	1.4	0	15	0.4	0	6.1	79	175	140	5	30
94	EC gc G5 23/23	10.5	750	5	0	0	0	23	23	2	1	0	0	0.7	0	15	1	0	6.1	79	175	140	4	30
95	EC mo G2 42/42	10.5	650	2	0	0	0	42	42	2	1	0	0	2	0	-5	5	0	6.1	79	175	180	1	30
96	EC mo G2 52/52	10.5	650	2	0	0	0	52	52	2	1	0	0	2	0	5	1	0	6.6	79	175	180	1	30
97	EC mo-gc G3 42/42	10.5	650	3	0	0	0	42	42	2	1	0	0	2	0	-5	5	0	6.1	79	175	180	1	30
98	EC mo-gc G3 52/52	10.5	650	3	0	0	0	52	52	2	1	0	0	2	0	5	1	0	6.6	79	175	180	1	30
99	EC mo-gc G4 52/52	10.5	750	4	0	0	0	52	52	2	1	0	0	1.4	0	15	0.4	0	6.6	79	175	180	5	30
100	EC vs-ac G3 A23 61/61	10.5	650	3	0	0	23	61	61	2	1	0	0	1.4	0	25	0.4	0	6.6	79	175	180	2	30
101	EC gc-ac G3 A23 42/42	10.5	750	3	0	0	23	42	42	2	1	0	0	2	0	5	1	0	6.6	79	175	90	3	30
102	EC gc-ac G3 A41 42/42	10.5	750	3	0	0	41	42	42	2	1	0	0	2	0	25	1	0	7	87	175	45	3	30
103	EC gc-ss G3 S23 A23 42/52	10.5	750	3	0	23	23	42	52	2	1	0	0	2	0	15	0.4	0	6.6	79	175	90	4	30
104	EC pe-gc G3 52/52	10.5	650	3	0	0	0	52	52	2	1	0	0	2	0	15	1	0	6.6	79	175	140	1	30
105	EC pe-gc G4 52/61	10.5	750	4	0	0	0	52	61	2	1	0	0	1.4	0	25	0.4	0	6.6	79	175	140	5	30
106	PE gc G3 k 61/61	10.5	650	3	0	0	0	61	61	2	1	0	0	2	0	25	0.4	0	7	96	175	180	3	30
107	PE gc G4 k 61/61	10.5	750	4	0	0	0	61	61	2	1	0	0	1.4	0	25	0.4	0	6.6	87	175	180	5	30
108	PE gc G4 k 61/61	10.5	750	4	0	0	0	61	61	2	1	0	0	1.4	0	25	0.4	0	6.6	87	175	140	5	30
109	PE gc-st G4 W4 S21 A25 61/61	10.5	575	4	4	11	25	61	61	2	1	0	0	2	0	15	1	3	6.6	96	175	275	3	20
110	PE gc G5 k 61/61	10.5	750	5	0	0	0	61	61	2	1	0	0	0.7	0	25	0.4	0	6.6	87	175	140	5	30
111	PE gc G5 k3 61/61	10.5	750	5	0	0	0	61	61	2	1	0	0	1.4	0	25	0.4	6	8.1	96	175	350	5	30
112	PE gc G5k4 61/61	10.5	750	6	0	0	0	61	61	2	1	0	0	1.4	0	25	0.4	0	6.1	87	175	140	5	30
113	PE ss-gc G4 S23 A23 k 61/61	10.5	750	4	0	23	23	61	61	2	1	0	0	1.4	0	25	0.4	0	7.5	96	175	180	5	30
114	PE ss-gc G4 S23 A33 k 61/61	10.5	650	4	0	23	33	61	61	2	1	0	0	1.4	0	25	0.4	3	8.1	96	175	140	5	30
115	VS ti G2 52/52	10.5	575	2	0	0	0	52	52	2	1	0	0	2	0	5	5	3	6.6	96	175	275	2	20
116	VS gc G3 52/52	10.5	650	3	0	0	0	52	52	2	1	0	0	1.4	0	15	0.4	0	6.1	87	175	225	2	20
117	VS gc G5 k3 52/52	10.5	750	5	0	0	0	52	52	2	1	0	0	1.4	0	15	1	6	8.1	96	175	225	4	30
118	VS ss-gc G3 S32 A41 42/52	10.5	750	3	0	32	41	42	52	2	1	0	0	2	0	25	0.4	6	8.7	96	175	90	5	30
119	VS ss-gc G4 S32 A41 53/61	10.5	650	4	0	32	41	53	61	2	1	0	0	1.4	0	25	0.2	3	6.6	96	175	45	5	30
120	VS ss-gc G4 W3 S23 A23 53/61	10.5	650	4	3	23	23	53	61	2	1	0	0	1.4	0	25	0.2	3	7.5	96	175	140	3	30
121	VS ss-gc G4 S23 A42 52/61	10.5	750	4	0	23	42	52	61	2	1	0	0	1.4	0	25	0.4	3	8.1	96	175	140	5	30
122	GS mo G6 42/42	10.5	750	6	0	0	0	42	42	2	1	0	0	1.4	0	5	1	0	6.1	87	175	90	5	30
123	GS mo G6 52/52	10.5	750	6	0	0	0	52	52	2	1	0	0	1.4	0	15	1	0	6.1	87	175	140	5	30
124	GS mo G6 k4 52/52	10.5	750	6	0	0	0	52	52	2	1	0	0	1.4	2	15	1	1	7	96	175	140	4	30
125	GS mo G6 k3 52/61	10.5	750	6	0	0	0	52	61	2	1	0	0	0.7	0	25	0.4	3	7.5	96	175	225	5	30
126	GS pe G6 k3 61/61	10.5	750	6	0	0	0	61	61	2	1	0	0	1.4	1	25	0.4	0	6.6	87	175	180	5	30
127	GS pe G6k4 61/61	10.5	750	6	0	0	0	61	61	2	1	0	0	1.4	0	25	0.4	1	7	96	175	140	5	30
128	GS pe-ac G6 A23 52/52	10.5	750	6	0	0	23	52	52	2	1	0	0	1.4	0	15	1	3	8.1	96	175	140	4	30
129	GS ss G6 S23 A22 52/52	10.5	750	6	0	23	22	52	52	2	1	0	0	1.4	0	15	1	3	8.1	96	175	225	4	30
130	GS ss-pe G6 S23 A23 61/61	10.5	750	6	0	23	23	61	61	2	1	0	0	1.4	0	25	0.4	3	8.1	96	175	275	5	30

Nr nou	Tip, subtip, varietate	3C	4C	14	15	16	17	23A	23B	29	33	34	38	39	40	44	50	61	63	69	133	144	181	271
131	GS ss-pe G6 S23 A32 52/52	10.5	750	6	0	23	32	52	52	2	1	0	0	1.4	0	15	1	3	8.1	96	175	225	4	30
132	GS ss-pe G6 S42 A41 52/52	10.5	750	6	0	42	41	52	52	2	1	0	0	1.4	0	15	0.4	6	8.7	96	175	180	5	30
133	SN sc-gc G3 S32 A41 42/52	10.5	750	3	0	32	41	42	52	2	1	0	0	2	0	25	0.4	6	8.7	96	175	90	5	30
134	SN gc G3 S22 A51 52/61	10.5	750	3	0	22	51	52	61	2	1	0	0	2	0	25	0.2	6	9.2	96	175	45	5	30
135	SN gc G5 S32 A51 42/52	10.5	750	5	0	32	51	42	52	2	1	0	0	1.4	0	25	0.4	6	9.2	96	175	90	5	30
136	SN gc G5 S41A51 52/61	10.5	650	5	0	41	51	52	61	2	1	0	0	1.4	0	25	0.2	6	9.2	96	175	90	5	30

Also, are needed measures to improve the physical condition of soil from areas affected by natural degradation processes at the surface, which relate primarily to reduce the number of soil works, placing long-term crop rotations, plant protectors, integrated control of pests and diseases, improving fertilization.

CONCLUSIONS

Between terrain and soil 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 as well as the depositary of the influence of other environmental factors, recorded at a time in one place, while being more stable and easier to record and study (even current level of equipment, specialized units, weaker than other sectors of national economy, in terms of their environmental effectiveness).

Systematic pedological and agrochemical soil mapping conducted by the Office of Pedological and Agrochemical Studies in our country provides valuable data on the evolution of soil quality, establish and implement differentiated culture technologies, land evaluation and determining suitability for various crops, foundation works and land reclamation ameliorative technology, organization and systematization of territory, etc.

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

Such detailed knowledge of productive and technological characteristics of the contributing, restrictive or limiting factors of agricultural production, both in terms of the actual event and in terms of real possibilities for modifications, may be better for decision-making bodies (government, administration local) a valuable tool for achieving the most appropriate practical measures for the benefit of plant biomass production to improve its conditions of human life and the entire community.

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