USING PEDOLOGICAL AND AGROCHEMICAL INFORMATION IN DETERMINING OF AGRICULTURAL LAND PRODUCTIVITY FROM VINGA PLAIN

Adrian ŢĂRĂU, Daniel DICU, Dan DOLOGA

Banat's University of Agricultural Science and Veterinary Medicine Timişoara Calea Aradului no.119, 300645 Timişoara, Romania
E-mail:dicudanield@gmail.com

Abstract:*Using the data obtained through out pedological studies and researches conducted by specialists from OSPA Timisoara and materialized in "Banat soils map", updated in 1999 and 2003 with new pedological studies and also with data gathered from the agricultural and forest sites of the national monitoring syste. The researches regarding the evolution of the agro-ecosystems quality and productivity from the Vinga High Plain tries to highlight the quality and quantity changes emerged in the agricultural ecosystem. It concerning a surface of 141249 hectares (72721ha in Timis County and 68528 ha in Arad county), belonging to cadastral territorys situated in Vinga Plain or in the areas of low plain near this or near Lipova Hills : Variaş, Satchinez, Orţişoara, Maşloc, Sânandrei, Biled, Becicherecu Mic, Timişoara, Dumbrăviţa, Giarmata, Remetea Mare, Ghiroda (in Timiş County) and Secusigiu, Felnac, Şagu, Vinga, Arad, Fântânele, Zăbrani, Lipova (in Arad county). The examination of eco-pedological conditions, were setting in order and processing dates were made according to „The Pedological Studies Elaboration Methodology ", (vol. I, II, III) of ICPA Bucharest, in 1987 and Romanian Taxonomic System of Soils (SRTS-2003). There are presented some aspects regarding the physical and geographical characterization of investigated area. Here are briefly introduced the geology and lithology of surface materials, clime conditions, land drainage etc., as defining elements for edaphic resources' main characteristics. Also, regarding the soil conditions have been determined the defining characteristics for the ecosystems productivity, granulated structure and humus content. In close relation with the first two aspects have been established the water content and the cationic change capacity. In order to determine the complex relation that take place between different soil characteristics and agro-ecosystems components, the researches were conducted both on field and laboratory. Studying the natural conditions (relief, lithology, hydrology, clime) and the antrophic ones it can be observed that the diversity of pedoclimatic conditions and the specific characteristics of the studied area have a great impact upon land resources and the way lands are used in general and in particular the agricultural ones (and also upon their actual and future productivity).*

Key words : *pedological, productivity, land, soil, resources*

INTRODUCTION

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

The natural conditions of the area taken into account are generally favorable for the development of agro-food sector in all aspects, with a long tradition in cereals cultivation and their recovery, especially by livestock.(CANARACHE A., TEACI D., 1980, CÂRSTEA S., 1995 DUMITRU M., ŞTEFĂNESCU S.L., 2000).

Also, intense drainage charged in NW corner of Banat, in the last decades of the twentieth century, led to lowering of groundwater ninvelului from 1-2 m to 5-7 m, which has generated the climate change, the emergence of dusty phenomena.

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

Of course knowledge of natural conditions and regional particularities of the environmental potential of land for various utilities and certain cultures have a great economic and social importance for both large and for small farm producers (CANARACHE A., TEACI D., 1980,. CÂRSTEA S., 1995, DUMITRU M., AND ALL, 2000, FLOREA N., COLAB.1987).

Use these resources to be carried in a comprehensive, coordinated simultaneous achievement of several goals aligned with environmental protection requirements.

Inadequate or incomplete application of technology may cause some irreversible changes of natural resources, changing even their renewable nature.

The factor who transforming almost completely and irreversibly the renewable natural resources is the man.

In this process, the natural and man-induced resources, the land fund, the agro-forestry and social fund will determine the development direction of rural land: agriculture, industry, services, agro-tourism, etc.

Based on these considerations, the authors try to present in this paper, based on dates drawn from scientific research themes conducted over several years and on a impressive volume of data accumulated in the archive of OSPA Timisoara and Arad, several issues concerning the status of soil quality and the evolution of the main factors that contributes to achieving it.

MATERIALS AND METHODS

The issues addressed relate to an area of 141249 hectares (72721ha in Timis County and 68528 ha in Arad county), belonging to cadastral territories located in Vinga Plain and its connection to the low plain or Lipova hills, respectively: Variaş, Satchinez, Orţişoara, Maşloc, Sânnandrei, Biled, Becicherecu Mic, Timişoara, Dunbrăviţa, Giarmata, Remetea Mare, Ghiroda (Timiş county), Secusigiu, Felnac, Zădăreni, Şagu, Vinga, Arad, Fântânele, Frumuşeni, Zăbrani , Lipova (Arad county), of which only: Secusigiu, Felnac, Zădăreni, Şagu, Vinga, Fântânele, Frumuşeni, Zăbrani (Arad county) and Orţişoara, Dunbrăviţa, Giarmata (Timiş county), are located entirely in Vinga plain other occupying proportions between 7-86%, respectively: Dudeştii Noi 7,06 %, Becicherecu Mic 7,96%, Timişoara 21,80%, Variaş 24,22%, Biled 26,66%, Lipova 43,50%,Arad 53,71%, Remetea Mare 61,33%, Maşloc 63,46%, Ghiroda 63,88%, Sânandrei 67,36%,Satchinez 75,52%, Pişchia 85,96%.

The research of ecopedological conditions, ordering and processing was done in accordance with the Methodology of elaborating soil studies (Vol I, II, III), developed by ICPA Bucharest in 1987 and the Romanian System of Soil Taxonomy (SRTS-2003).

RESULTS AND DISCUSIONS

Following of its settlement, his natural conditions (relief, lithologic, hydrology, vegetation) are specific to an high plains, where they formed and evolved main soil types that reflect throught the geological, biological, chemical and morphological characteristics the main landscape characteristics defining and determining the growth and fruiting of the main cultivated plants.

The area of 141249 ha in which they were carried out the researches is part of the piedmont plain of Glacis of Vinga (high plain), part of Mures Plain.

That is the oldest and most complex plain, from the geographicaly point of view (POSEA, 1997), and is located at south of Mures, at west of the plateau Lipova, at north of Bega-Timis subsidence area and at east of the subsidence area Giucoşin - Aranca.

Table 1

Surface structure (ha) for the main categories of uses

Nr.	Locality	Arable	Pasture	Grassland	Wineyard	Orchard	Total agricultural	Forests	Waters	Roads and railways.	Court and Building	Un-productive	Total unagricultural	Total general
1	Arad	16942	1901	133	0	0	18976	1146	712	639	3523	289	6309	25285
2	Felnac	4012	95	4	3	1	4115	429	96	143	171	6	845	4960
3	Fântânele	3249	296	129	0	0	3674	90	116	100	60	144	510	4184
4	Frumuşeni	3615	269	28	0	0	3912	111	77	56	135	24	403	4315
5	Secusigiu	10060	898	166	0	0	11124	1601	428	310	246	262	2847	13971
6	Şagu	8596	786	288	42	0	9711	76	45	250	173	11	555	10266
7	Vinga	10050	603	1037	0	0	11690	101	354	259	324	73	1111	12801
8	Zăbrani	6803	1455	221	0	594	9073	1965	184	258	230	68	2705	11778
9	Zădăreni	2067	80	24	1	1	2173	80	62	107	89	3	341	2514
	Arad County	***65394***	***6383***	***2030***	***45***	***596***	***74448***	***5599***	***2074***	***2122***	***4951***	***880***	***15626***	***90074***
1	Becicherecu Mic	3421	504	383	1	1	4310	2	135	102	116	0	355	4665
2	Biled	8853	972	16	3	1	9845	0	242	278	302	25	847	10692
3	Dudeştii Noi	3705	1124	200	5	0	5034	6	142	86	106	19	359	5393
4	Dumbrăviţa	1311	89	7	1	2	1410	2	42	54	382	8	488	1898
5	Giarmata	4945	1023	143	184	296	6591	16	87	176	279	1	559	7150
6	Ghiroda	2241	338	218	3	12	2812	5	125	108	336	27	601	3413
7	Maşloc	5167	1120	507	0	163	6957	983	25	173	137	6	1324	8281
8	Orţişoara	11633	1560	524	2	74	13793	57	112	292	254	55	770	14563
9	Pişchia	7203	1261	513	285	489	9751	1963	188	269	164	26	2610	12361
10	Remetea Mare	7286	1308	200	62	14	8870	875	241	213	303	39	1671	10541
11	Satchinez	8027	583	314	2	7	8933	10	482	222	253	88	1055	9988
12	Timişoara	7060	426	224	39	84	7833	649	318	1062	2990	75	5094	12927
13	Variaş	9485	722	157	1	1	10366	1	148	271	320	61	801	11167
	Timiş County	**80337**	**11030**	**3406**	**588**	**1144**	**96505**	**4569**	**2287**	**3306**	**5942**	**430**	**16534**	**113039**
	Total general	***145731***	***17413***	***5436***	***633***	***1740***	***170953***	***10168***	***4361***	***5428***	***10893***	***1310***	***32160***	***203113***

Vinga High plain was formed by the divergence of glaciss shaped mostly by a network of secondary rivers and valleys at a rate between 95-200 m comparring to baseline.

Its relief is in the form of series of high fields, almost flat, whose altitude decreases from east to west, separated by wide valleys, pretty deep, most without permanent leak.

The slopes of the erosion valleys are most often pronounced inclined due the lithologic structures, but have a stable profile (cases of sliding or slipping were isolated found).

Major relief of Vinga plain is the most typical morphological Piedmont, piedmont plain terrace type with local tectonic influence throughout Western Plain, in his step could see some type of crossings piedmont terraces-line, generally without obvious sure connected top points in terraces (POSEA, 1997).

Vinga Plain has four altitudinal steps, situated in a fan made of Mures in different stages and the influence of local tectonics influence, especially hidden Luda-Bara, which produced a vault in the east, a circular radial hydrography, asymmetric and a similar plain fragmentation and forming, near Lipova Plateau two interfluve fields, convex and elongated NE to SW and the other almost circular radial diverted by SW.

The minor relief of Vinga Plain consists of flat-bottomed valleys, particularly towards Mures, sliding hillsides bordering the Măgheruş valley, depressins with different shapes (circular, elongated, kidney, lenticular, etc.) and sizes that rarely exceeding 0.5 hectares and waterside micro-relief and anthropical landscape.

Geological past of the studied area, is linked to the Banato-Crişana Plain, who also is part of it being one of the great eastern portions of the sedimentary basin called Pannonian Depression. It sank on the alignments of ancient north-south fault, more towards the west and less towards the Carpathians, starting with Badenian, with a maximum during the Pannonian and then became slower (IANOŞ 1994).

Following gravimetric measurements, it is assumed that the foundation of Vinga Plain is a witness of an ancient region of the Carpathian orogen completed with pedestal, fragmented and submerged differently.

The Carpathian stages have different influenced the crystalline blocks movement from the foundation of fields, creating regular areas with greater tendency diving, or vice versa, the crystalline blocks east, generally higher, are found at depths of about 1000 m (980m in Găvojdia in the west and southwest down to 200 m, Giulvaz-Foeni (POSEA 1997).

In contrast, penetration of marine waters (Thetys sea) on the walkways between blocks have favored deposition of sediments on variable thickness (1000-2000 m).

Although it is bounded to the north of the actual course of the Mures, the researched space is part of Bega hidrographical basin, underbasin Beregsău.

Rivers conditions is subject to relatively large variations. In the upper, the climatic and topographical conditions prints to the river network a high density and an increased flow compared with middle and lower slope where to the very low flow is tendency to ramble frequently.

Deppending the place of springs in the researched area, where are two types of streams:

- 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 of Vinga Plain 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 Bucharest network (Timisoara and Arad), located at a distance of 60 km between them and the data recorded at the meteorological station at SC-DA Lovrin.

The lowest pluviometric values, the average rainfall (500-600 mm), are recorded in the west of the Vinga Plain at its junction with low plains, that Galaţca Plain. Also, a special feature points in central and western area of the high plains of Vinga, where showed the lowest pluviometric value annual average for 405.1 mm (1999-2000 at Arad Meteorological Station) and 412.5mm (the Timisoara meteorological station 1999-2000).

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

In this context they highlighted the importance of woody southern European species in vegetation cover building, representative of the studied area, the species as: Quercus cerris, Quercus fornitto, Quercus pubescens, Tillia tomentosa, Fraxinus ornus, Cornus mas, forming biocoenosis as a housing a remarkable number of thermophilic grass species (COSTE, 1997).

As a result of geographical position, at the interference between the plain and low hills, in the former delta of Mures, territory taken in the trial have the geological and physical-geographical range, fact which has conditioned the formation of a complex soil cover.

Thus, the soils in the examined area were formed under a moderate temperate climate with oceanic and Mediterranean influences, on a terrain composed of extensive plains, corrugated, deeply furrowed by valleys of erosion, with steep slopes, heavily eroded, with groundwater at less than 5 m deep and porous carbonated rocks, by loessoid type.

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 141249 ha.) and the climate or the hydrological factors and the various human interventions, have result a large soil population with specific characteristics (related or totally different from each) in continuous evolution.

According to the Romanian System of Soil Taxonomy (SRTS 2003) in the investigated area were identified 8 soil classes, 12 types, 40 subtypes, 153 varieties and many detailed units, which differ distinctly from their property, productive capacity and measures of maintaining and increasing fertility, soil hub map includes the following soil types and subtypes, with areas representing the surface of 141249 ha, 100% of the studied area:

1. Fluvisols (eutric, mollic, entic, gleyic, salsodic), including 16 TEO (1-16) on an surface of 6141,15 ha, 4,36%,

2. Chernozeums (pellic, vertic, gleyic, cambic, argic), including 13 TEO (17-29), on an surface of 49047,53 ha, 34,76%,

3. Phaeozeums (pellic, vertic, stagnic, cambic, argic), including 10 TEO (30-39), on an surface of 11985,71ha, 8,49%,

4. Eutric Cambisols (typic, mollic, pellic, alluvic, gleyic), including 26 TEO (40-65), on an surface of 9469,52 ha, 6,72%,

5. Haplic Luvosols Chromic (typic, mollic, pellic, vertic, stagnic), including 42 TEO (66-107), on an surface of 45572,45 ha, 32,19%,

6. Pelosols (gleice, stagnice,salsodice), cuprinzând un număr 7 TEO (108-114), on an surface of 3367,88 ha, 2,39%,

7. Vertisols (stagnic, gleyic), including 7 TEO (115-121), on an surface of 4953,00 ha, 3,51%,

8. Gleyisols (mollic, cernic), including 14 TEO (122-135), on an surface of 4138,15 ha, 2,93%,

9. Stagnic Luvisols (typic, vertic, pellic, gleyic), including 4 TEO (136-139), on an surface of 821,52 ha, 0,58%,

10. Solonetzs (sallinic, gleyic, stagnic), including 3 TEO (140-142), on an surface of 336,14 ha, 0,24%,

11. Erodosols (cambic, argic, calcaric, pellic), including 9 TEO (143-151), on an surface of 4817,21 ha, 3,41%,

12. Anthrosols (pellic, calcaric), including 2 TEO (152-153), on an surface of 598,74 ha, 0,42%.

Each of the 153 units of land identified were characterized according with the current Methodology for Elaboration of Pedological Studies using the 23 indicators of evaluation, indicators representing characters and qualities most important, more significant, clear and easily measurable, which is usually found in pedological mapping work, produced after 1987 by territorial OSPA under the methodological guidance of ICPA Bucharest (Table 2).

The evaluation of agricultural land is a complex operation of knowledge of the conditions of plant growth, development and fruition and determining the degree of favorability (suitability) for their particular culture (or category of use), through a system of technical indicators and notes of evaluation (Table 3).

The amount of harvest that is obtained per unit of surface, so the productivity of agricultural plants, depends on the entire set of environmental conditions (relief, climate, hydrology, soil), and the man who can influence change for the better natural factors or characteristics of the plant in so as to better exploit the natural conditions (Table 4).

This goal requires a detailed knowledge of organic supply generically defined as all natural factors of a complex variable development and maintaining necessary structural genesis of abiotic and biotic systems by achieving a harmonious balance between improving soil and plant improvement measures consistent according with the production of them.

Evaluation studies and technological characterization of land made by our country OSPA provides valuable information on eco-pedological offer, evaluation and land quality development, required to develop capable technologies of ensuring an ecological balance, based on the performance of long-term experiences with: fertilizers, amendments, crop rotation, etc.., located in specific climatic zones of Timis County, managed by representative units in research and education: USAMVB Timisoara, SCDA Lovrin, OSPA Timisoara.

In this context, land productivity, as a result of the diversity of physical and geographical conditions and the intrinsic qualities of soil and human interventions occurring, is much different in time and space.

CONCLUSIONS

The timeliness of mapping activity and assessment of land evaluation result from the fact that land, in addition to attributes of historical and naturally body, is the most important means of production in agriculture and forestry and a good that is the subject of property and therefore, exchange object on market with a certain use amount.

Systematic soil mapping and soil agrochemical studyes conducted by OSPA in our country provides valuable data on the evolution of soil quality, establish and implement differentiated culture technology, land evaluation and establish the favorability for different cultures, the foundation of land improvement and land technology improvement methods, organization and territory systematization etc.

The pedological substantiation of evaluation operations reveal that the earth is very different, in territory, because of the variation factors and characteristics of environmental conditions.

Table 2

Legend table, the values of ecopedological indicators

TEO	TIP-SUBTIP	PS	FN	MR	PR	PN	CV	CS	PC	VV	VM	GR	OR	PB	FS	CT	SF	SO	MF	IU	IF	CN	LU	TR	LG	AR	PO	VI
1.01	AS en	81	65	50	73	50	51	57	57	65	45	52	52	65	65	51	57	52	50	57	52	45	50	52	57	57	59	55
2.01	AS en	65	50	50	58	56	43	43	43	44	32	38	38	36	36	32	29	36	43	36	34	25	43	40	36	36	49	38
3.01	AS en-gc	65	50	45	52	56	43	39	39	40	26	34	34	36	32	29	29	32	39	32	34	23	30	40	36	33	46	33
4.01	AS ti	73	58	81	90	72	81	90	90	90	80	72	72	80	80	63	70	72	72	70	72	63	80	64	70	73	84	85
5.01	AS ti	73	58	73	81	72	81	81	81	81	72	65	65	80	72	57	70	65	65	63	65	57	64	64	70	67	78	77
6.01	AS ti	90	72	90	90	100	100	90	90	90	90	81	81	90	81	73	90	81	81	90	81	81	80	72	80	82	93	90
7.01	AS ti	90	72	01	01	90	01	73	73	01	01	01	01	90	01	66	01	01	01	90	73	01	00	72	00	00	00	01
8.01	AS gc	73	58	81	90	72	81	90	90	90	80	72	72	80	80	63	70	72	72	70	72	63	72	64	70	73	84	85
9.01	AS gc	90	72	90	90	100	100	90	90	90	90	81	81	90	81	73	90	81	81	90	81	81	80	72	80	82	93	90
10.01	AS gc	90	81	50	64	65	58	52	52	51	45	65	65	73	65	52	66	58	65	72	66	65	49	58	65	64	57	48
11.01	AS pe-gc	81	81	23	33	37	26	23	23	29	23	47	41	58	52	34	52	42	47	47	38	41	31	42	52	47	28	26
12.01	AS mo gc	90	80	90	90	100	100	90	90	90	90	90	90	100	90	81	100	90	90	90	81	90	80	80	100	91	93	90
13.01	AS mo-gc	90	00	90	90	100	100	90	90	90	90	90	90	100	90	01	100	90	90	90	01	90	00	00	100	91	93	90
14.01	AS mo-gc	51	52	10	26	5	9	15	19	23	19	32	32	48	48	36	48	36	43	48	38	38	29	38	48	40	14	21
15.01	AS ss	44	31	3	4	5	5	5	4	5	4	10	14	5	14	3	14	4	5	8	4	4	12	4	9	9	4	5
16.01	AS gc-st	50	35	12	18	16	10	9	9	15	9	23	23	26	27	16	23	24	27	18	17	18	22	24	26	24	12	12
17.01	CZ cb	81	72	90	81	90	90	90	81	90	90	90	90	90	90	81	90	90	90	90	81	90	90	72	90	89	87	90
18.01	CZ pc	81	72	90	81	90	81	81	73	90	90	90	90	90	90	73	81	90	90	90	73	90	90	72	90	87	83	90
19.01	CZ pt	81	72	81	73	81	73	73	66	81	81	90	90	90	90	73	81	90	90	90	73	90	90	72	90	87	75	81
20.01	CZ pe	90	81	63	72	72	65	65	65	72	65	81	81	81	81	66	73	73	81	81	66	81	81	65	81	77	67	69
21.01	CZ pe	81	72	90	90	80	90	100	90	100	100	90	90	100	100	90	100	90	90	100	90	90	100	80	100	94	90	100
22.01	CZ pe	90	80	90	90	90	81	81	81	90	90	100	100	100	100	81	90	100	100	100	81	100	100	80	100	96	86	90
23.01	CZ cb	81	72	81	81	81	81	81	81	81	81	90	90	90	90	81	90	90	90	90	81	90	90	72	90	89	81	81
24.01	CZ cb	81	72	73	73	81	66	66	66	73	73	81	81	81	81	66	73	81	81	81	66	81	81	65	81	78	71	73
25.01	CZ cb	81	72	81	81	90	73	73	73	81	73	81	81	73	73	59	66	73	81	81	66	81	81	65	73	73	79	77
26.01	CZ ar	81	72	73	73	81	66	66	66	73	73	81	81	81	81	66	73	81	81	81	66	81	81	65	81	78	71	73
27.01	CZ ar	64	56	65	72	72	65	65	65	72	65	72	72	65	65	47	52	65	72	72	52	72	72	52	65	64	67	69
28.01	CZ ar	90	81	57	65	72	58	58	58	65	58	73	73	73	73	59	66	66	73	73	59	73	73	58	73	70	61	62
29.01	CZ vagca	90	80	73	73	90	73	66	66	73	73	81	81	90	81	66	81	81	81	81	66	81	72	72	90	80	74	73
30.01	FZ ca-gc	01	72	01	01	90	73	73	73	01	01	01	01	01	01	66	73	01	01	01	66	01	01	65	01	70	79	01
31.01	FZ ca	64	56	65	72	72	65	65	65	72	65	72	72	65	65	47	52	65	72	72	52	72	72	52	65	64	67	69
32.01	FZ ar	58	52	65	50	57	65	50	58	58	50	65	50	58	50	58	58	50	50	36	45	43	43	58	50	55	58	54
33.01	FZ ar	73	58	65	65	73	58	58	58	65	65	73	65	65	65	52	58	65	65	72	58	65	72	58	58	64	63	65
34.01	FZ ar	64	50	58	65	65	58	58	58	65	65	65	65	65	65	47	52	65	65	72	52	65	72	47	58	61	60	65
35.01	FZ ar vo	58	52	65	50	57	58	15	52	58	50	65	50	58	50	52	52	50	50	36	41	43	43	58	50	53	55	54
36.01	FZ gc-st	01	73	30	50	49	42	32	32	32	23	50	50	56	50	20	40	45	50	30	40	43	30	51	56	49	41	20

Table 3

Notes of soil natural evaluation

TEO	TIP-SUBTIP	PS	FN	MR	PR	PN	CV	CS	PC	VV	VM	GR	OR	PB	FS	CT	SF	SO	MF	IU	IF	CN	LG	TR	LG	AR	PO	VI
1.01	AS en	01	65	50	73	50	51	57	57	65	45	52	52	65	65	51	57	52	50	57	52	45	50	52	57	57	59	55
2.01	AS en	65	50	50	58	56	43	43	43	44	32	38	38	36	36	32	29	36	43	36	34	25	43	40	36	36	49	38
3.01	AS en-gc	65	50	45	52	56	43	39	39	40	26	34	34	36	32	29	29	32	39	32	34	23	30	40	36	33	46	33
4.01	AS ti	73	58	81	90	72	81	90	90	90	80	72	72	80	80	63	70	72	72	70	72	63	80	64	70	73	84	85
5.01	AS ti	73	58	73	81	72	81	81	81	81	72	65	65	80	72	57	70	65	65	63	65	57	64	64	70	67	78	77
6.01	AS ti	90	72	90	90	100	100	90	90	90	90	81	81	90	81	73	90	81	81	90	81	81	80	72	80	82	93	90
7.01	AS ti	90	72	01	01	90	01	73	73	01	01	01	01	90	01	66	01	01	01	90	73	01	00	72	00	00	00	01
8.01	AS gc	73	58	81	90	72	81	90	90	90	80	72	72	80	80	63	70	72	72	70	72	63	72	64	70	73	84	85
9.01	AS gc	90	72	90	90	100	100	90	90	90	90	81	81	90	81	73	90	81	81	90	81	81	80	72	80	82	93	90
10.01	AS gc	90	81	50	64	65	58	52	52	51	45	65	65	73	65	52	66	58	65	72	66	65	49	58	65	64	57	48
11.01	AS pe-gc	81	81	23	33	37	26	23	23	29	23	47	41	58	52	34	52	42	47	47	38	41	31	42	52	47	28	26
12.01	AS mo gc	90	80	90	90	100	100	90	90	90	90	90	90	100	90	81	100	90	90	90	81	90	80	80	100	91	93	90
13.01	AS mo-gc	90	00	90	90	100	100	90	90	90	90	90	90	100	90	01	100	90	90	90	01	90	00	00	100	91	93	90
14.01	AS mo-gc	51	52	10	26	5	9	15	19	23	19	32	32	48	48	36	48	36	43	48	38	38	29	38	48	40	14	21
15.01	AS ss	44	31	3	4	5	5	5	4	5	4	10	14	5	14	3	14	4	5	8	4	4	12	4	9	9	4	5
16.01	AS gc-st	50	35	12	18	16	10	9	9	15	9	23	23	26	27	16	23	24	27	18	17	18	22	24	26	24	12	12
17.01	CZ ob	81	72	90	81	90	90	90	81	90	90	90	90	90	90	81	90	90	90	90	81	90	90	72	90	89	87	90
18.01	CZ pc	81	72	90	81	90	81	81	73	90	90	90	90	90	90	73	81	90	90	90	73	90	90	72	90	87	83	90
19.01	CZ pe	81	72	81	73	81	73	73	66	81	81	90	90	90	90	73	81	90	90	90	73	90	90	72	90	87	75	81
20.01	CZ pe	90	81	63	72	72	65	65	65	72	65	81	81	81	81	66	73	73	81	81	66	81	81	65	81	77	67	69
21.01	CZ pe	81	72	90	90	80	90	100	90	100	100	90	90	100	100	90	100	90	90	100	90	90	100	80	100	94	90	100
22.01	CZ pe	90	80	90	90	90	81	81	81	90	90	100	100	100	100	81	90	100	100	100	81	100	100	80	100	96	86	90
23.01	CZ ob	81	72	81	81	81	81	81	81	81	81	90	90	90	90	81	90	90	90	90	81	90	90	72	90	89	81	81
24.01	CZ ob	81	72	73	73	81	66	66	66	73	73	81	81	81	81	66	73	81	81	81	66	81	81	65	81	78	71	73
25.01	CZ ob	81	72	81	81	90	73	73	73	81	73	81	81	73	73	59	66	73	81	81	66	81	81	65	73	73	79	77
26.01	CZ ar	81	72	73	73	81	66	66	66	73	73	81	81	81	81	66	73	81	81	81	66	81	81	65	81	78	71	73
27.01	CZ ar	64	56	65	72	72	65	65	65	72	65	72	72	65	65	47	52	65	72	72	52	72	72	52	65	64	67	69
28.01	CZ ar	90	81	57	65	72	58	58	58	65	58	73	73	73	73	59	66	66	73	73	59	73	73	58	73	70	61	62
29.01	CZ vagca	90	80	73	73	90	73	66	66	73	73	81	81	90	81	66	81	81	81	81	66	81	72	72	90	80	74	73
30.01	FZ ca-gc	01	72	01	01	90	73	73	01	01	01	01	01	01	01	66	73	01	01	01	66	01	01	65	01	70	79	01
31.01	FZ ca	64	56	65	72	72	65	65	65	72	65	72	72	65	65	47	52	65	72	72	52	72	72	52	65	64	67	69
32.01	FZ ar	58	52	65	50	57	65	50	58	58	50	65	50	58	50	58	58	50	50	36	45	43	43	58	50	55	58	54
33.01	FZ ar	73	58	65	65	73	58	58	58	65	65	73	65	65	65	52	58	65	65	72	58	65	72	58	58	64	63	65
34.01	FZ ar	64	50	58	65	65	58	58	58	65	65	65	65	65	65	47	52	65	65	72	52	65	72	47	58	61	60	65
35.01	FZ ar vo	58	52	65	50	57	58	15	52	58	50	65	50	58	50	52	52	50	50	36	11	13	13	58	50	53	55	54
36.01	FZ gc-st	01	73	30	50	49	42	32	32	32	23	50	50	56	50	20	40	45	50	30	40	43	30	51	56	49	41	20

Table 4

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

Crt. No.	Locality	Total arable surface ha	Class I 81-100 pct.	Class II 61-80 pct.	Class III 41-60 pct.	Class IV 21-40 pct.	Class V 0-20 pct.	Average Rating ***Arable***
1	Arad	16942	-	8991	7951	-	-	60
2	Felnac	4012	-	1860	1559	493	100	57
3	Fântânele	3249	-	1689	1560	-	-	58
4	Frumuşeni	3615	-	3615	-	-	-	75
5	Secusigiu	10060	-	8562	1498	-	-	63
6	Şagu	8596	-	6975	1621	-	-	64
7	Vinga	10050	-	10050	-	-	-	72
8	Zăbrani	6803	-	-	6803	-	-	55
9	Zădăreni	2067	-	2067	-	-	-	72
	Arad County	***65394***	**0**	**43809**	**20992**	**493**	**100**	
1	Becicherecu Mic	3421	2588	2605	1042	436	455	69
2	Biled	8853	4750	3501	520	77	5	77
3	Dudeştii Noi	3705	634	1828	5974	7270	551	46
4	Dumbrăviţa	1311	247	847	137	45	35	67
5	Giarmata	4945	128	912	2939	850	116	54
6	Ghiroda	2241	-	1225	846	157	13	59
7	Maşloc	5167	-	2702	4426	1356	543	50
8	Orţişoara	11633	2485	5403	2089	796	860	63
9	Pişchia	7203	-	2598	2123	1393	1089	46
10	Remetea Mare	7286	138	2653	3194	946	355	39
11	Satchinez	8027	4157	1753	1077	472	568	70
12	Timişoara	7060	679	2188	3201	766	226	54
13	Variaş	9485	5255	2700	1175	203	152	74
	Timiş County	**80337**	**21061**	**30915**	**28743**	**14767**	**4968**	
	Total general	***145731***	**21061**	**74724**	**49735**	**15260**	**5068**	

The vegetable production is accomplished in the different conditions: natural ecosystems, agricultural extensive or intensive ecosystems and it require as an urgent need deep knowledge of all the ecological factors which contribute to the growth and plant development.

BIBLIOGRAPHY

1. BORZA I., ȚĂRĂU D., ȚĂRĂU IRINA ,2002, Limitation Factors and terrain yeild including measures in Vinga high plain, Scientifical Papers, Faculty of Agriculture , XXXXIV, Ed. Oriy. Univ. Pg. 69-76
2. CANARACHE A., TEACI D., 1980, Caracterizarea tehnologică a terenurilor agricole ca bază a lucrărilor de raionare ameliorativă, Buletin Info. ASAS Bucureşti nr. 10;
3. CÂRSTEA S., 1995, Studiile pedologice componentă a cadastrului funciar, Ştiința Solului, seria III-a, vol. XXIX, nr.2, Bucureşti;
4. COSTE I., ȚĂRĂU D., ROGOBETE GH., 1997, Tendințe ale evoluției mediului înconjurător în sud-vestul României, Lcr. şt. ale S.N.R.S.S., Filiala Timişoara,
5. DUMITRU M., ȘTEFĂNESCU S.L., SIMION PARANICI SIMONA, LUNGU MIHAELA, 2000, Strategy to sustainable agriculture in Romanian Danube Basin, an organic US conventional agriculture approach, Ed. Traide, Cluj Napoca;
6. FLOREA N., BĂLĂCEANU V., RĂUȚĂ C., CANARACHE A., 1987, Metodologia elaborării studiilor pedologice, vol. I, II şi III, Redacția de propagandă agricolă, Bucureşti;
7. IANOȘ GH., ROGOBETE GH., PUȘCĂ I., BORZA I., ȚĂRĂU D., 1994, Evoluția Câmpiei Banatului de la faza submersă la starea actuală, Lcr. şt. S.N.R.S.S. nr. 28C, Bucureşti,
8. POSEA GR. 1997,Câmpia de vest a României, Edit. Fundației 'România de Mâine ' Bucureşti,
9. TEACI D., 1980 Bonitarea terenurilor agricole. Bonitarea şi caracterizarea tehnologică a terenurilor agricole, Ed. Ceres, Bucureşti;
10. ȚĂRĂU D., MARTON GH., RACOVICEAN M., TRETA D., 2005, Impactul tehnologiilor informatice asupra activităților de cartare, actualizare şi modernizare a studiilor pedologice, Ştiința Solului, vol.XXXIX, nr.1-2, Ed. Signata Timişoara;
11. ȚĂRĂU D., BORZA I., , BĂGHINĂ N., DICU D., IORDACHE MĂDĂLINA, 2008, Dinamics of some phisico-chemical and hydrophisical characteristics of a cambic chernozeum from Vinga plain, in No-till cultivation system, Lucrări ştiințifice USAMVB, Seria A, Vol. LI, Bucuresti, ISSN 1222-5339