RESEARCH ON STOPPING THE TREND OF DESERTIFICATION IN SOUTHWESTERN ROMANIA (VINGA PLAIN)

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Abstract :*The purpose of research is accumulating scientific data on physical, hydro-physical and chemical characteristics of soil, necessary to support scientific and technical measures to stop the trend of desertification, through a complex firm approach of physical-geographical conditions from Vinga Plain. Between soil characteristics and main cultivated or spontaneous species, it can be establish relationships of a diverse and complex reciprocity. The soil characteristics can influence the development of the root system, mineral nutrition, providing aero-hydric and thermal regime needed to carry the main physiological processes and the plants can influence directly and indirectly the state of soil fertility. Research on the main physical and chemical characteristics of the soil were taken by many scientists in the country and abroad, since the beginning of last century, and the German classification system has been developed mainly based on soil texture in the so-called stages of its evolution. As part of the soil, the clay plays an important role in the relations established between certain physical and chemical properties of the soil and between them and the activities of organisms that inhabit it. Knowing these features of soil has a great theoretical and practical importance. Theoretical, because the specialist can interpret the phenomena that occur in soil and predict soil evolution in particular and environment evolution in the general and practical because it warns the practitioner on the measures that must be taken to bring land under optimal conditions for the growth and development of cultivated plants. The desertification trends are summarized but detailed presented, first being with the natural causes (climatic and edaphic conditions in terms of risk phenomena) and then the anthropic causes (deforestation, inappropriate agricultural practices, industrial pollution). The main indicators of desertification, according with UNCCD, are represented by increased solar radiation intensity, changing of the appearance characteristics of flora and fauna species adapted to desert conditions, perennial vegetation reduced below 5% and its concentration along the river system, soil erosion and loss of production capacity, drastic reduction of surface water and groundwater. The directions to reduce the effects of drought in the short, medium and long terms are the protection and conservation of existing water resources and building new water reservoirs, protection and soil conservation, protection and preservation of ecosystems, sustainable development of agriculture and forestry, public participation in the implementation of drought mitigation measures.*

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

INTRODUCTION

Environment represented by water, air, soil, vegetation and fauna is a set of spatial temporal formations that function as cybernetic systems, realizing permanent exchange of substances, energy and information, which have the potential to transform cosmic energy into potential energy which stores in plant and animal biomass.

In these systems, the soil is essential because it provides food and participate in cycles of ecosystems, being the cradle and source of existence of mankind.

Given these aspects of the existence of risks arising from the various manifestations of natural phenomena or due to irrational human intervention, in this paper, the authors attempt to divest descriptive to the analytical theory to provide practical solutions to sustainable management of

soil resources for removing extreme weather events and reduced risk of crop failure by introducing conservative tillage technologies adapted to new soil and climatic conditions.
A set of data from this work were the target goal of research topics aimed at achieving balanced economic and social development in the broad area, into consideration the protection and conservation of natural resources (water, soil, etc.) and the induced anthropogenic (technology, culture, etc).

MATERIALS AND METHODS

The issues addressed relate to an area of 141249 ha (72721ha in Timis County and 68528 ha in Arad county) of arable land (tab. 1) .

Table 1

Surface structure (ha) for the main categories of uses

Nr.	Locality	Arable	Pasture	Grassland	Wineyard	Orchard	Total agricultural	Forests	Total unagricultural	Total general
1	Arad	16942	1901	133	0	0	18976	1146	6309	25285
2	Felnac	4012	95	4	3	1	4115	429	845	4960
3	Fântânele	3249	296	129	0	0	3674	90	510	4184
4	Frumuşeni	3615	269	28	0	0	3912	111	403	4315
5	Secusigiu	10060	898	166	0	0	11124	1601	2847	13971
6	Şagu	8596	786	288	42	0	9711	76	555	10266
7	Vinga	10050	603	1037	0	0	11690	101	1111	12801
8	Zăbrani	6803	1455	221	0	594	9073	1965	2705	11778
9	Zădăreni	2067	80	24	1	1	2173	80	341	2514
	Arad County	***65394***	***6383***	***2030***	***45***	***596***	***74448***	***5599***	***15626***	***90074***
1	Becicherecu Mic	3421	504	383	1	1	4310	2	355	4665
2	Biled	8853	972	16	3	1	9845	0	847	10692
3	Dudeştii Noi	3705	1124	200	5	0	5034	6	359	5393
4	Dumbrăviţa	1311	89	7	1	2	1410	2	488	1898
5	Giarmata	4945	1023	143	184	296	6591	16	559	7150
6	Ghiroda	2241	338	218	3	12	2812	5	601	3413
7	Maşloc	5167	1120	507	0	163	6957	983	1324	8281
8	Orţişoara	11633	1560	524	2	74	13793	57	770	14563
9	Pişchia	7203	1261	513	285	489	9751	1963	2610	12361
10	Remetea Mare	7286	1308	200	62	14	8870	875	1671	10541
11	Satchinez	8027	583	314	2	7	8933	10	1055	9988
12	Timişoara	7060	426	224	39	84	7833	649	5094	12927
13	Variaş	9485	722	157	1	1	10366	1	801	11167
	Timiş County	**80337**	**11030**	**3406**	**588**	**1144**	**96505**	**4569**	**16534**	**113039**
	Total general	***145731***	***17413***	***5436***	***633***	***1740***	***170953***	***10168***	***32160***	***203113***

The research of eco-pedologic 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-2012).

RESULTS AND DISCUSIONS

The area in which the investigations were conducted part of interfluve Mures -Bega part of the Mures Plain.

Located one side of the course with the same name, Mures Plain is a complex plain, composed of: piedmont terrace (C. Vinga), scrap the old cone type piedmont (C. Nadlac), alluvial plain (C. Arad), alluvial lowland transition (C. Siria, C. Curtici, C. Livada, C. Jimbolia), alluvial plains (C. Ier, C. Aranca, C. Crisul Alb).

Vinga Plain, situated between Mureş and Bega, Ier and Black Water valleys, has its origin in the great Pleistocene deltas of Mures (which debus here to the great Pannonian lake in the early Quaternary) and connected to Lipova Hills throught corrugated or flat formations, resulting from Quaternary deposits of gravels, sands and clays (URUIOC STELA, 2002).

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.

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.

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.

Taking place at south of Mures between Lipova and Secusigiu (Satu Mare), the northern limit is given by the Mures valley also imposed a complex subsidence. The eastern boundary with Lipova Plateau is marked by an elevation of 40-60 m, between Lipova and Masloc, ranging from 180-190 m altitude and then the Beregsău (right side) to Sanandrei.

On the left of Beregsău, the plain penetrate throught meadows and valleys, low terraces descending from the Lipova plateau (Beregsău and Baciu). In this area the limit is more difficult to establish because Lipovei Plateau descends gently towards Bega, the glacis-terrace with hilly aspect, the limit will be at lower altitudes of 160-170 m

Between plain terraces of Bega (Lucaret Plain) and Vinga Plain, the conventional limit can be drawn by Ghertiamoş valley, between Ianova and Remetea Mare.

By altitude, Vinga Plain stepped down from 190 meters below Lipova Plateau, up to 110-100 m in the west and south. Presents a maximum altitude of 189 m from Luda-bar (east of Seceani) within 186 to 189.5m at the north-east of Masloc (in forest) in connection with Lipova Plateau, prevailing altitudes of 100-150 m (IANOŞ GH., PUŞCĂ I., GOIAN M., 1997)

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 (MIHĂILESCU V., 1966).

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).

Although it is bounded to the north of the actual course of the Mures, the researched space is part of Bega hidrographical basin, subbasin 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 (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 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 network (Timisoara and Arad), located at a distance of 60 km and data recorded at the meteorological station at SC-DA Lovrin.

Table 2

Monthly temperatures average, annual (1992-2012) and multianual in the range 1887-2012 (^{0} C) at weather stationTimișoara

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	16.6	11.5	6.6	-0.2	-1.0	-2.9	3.4	10.9	18.8	20.5	21.4	21.9	10.6
93--94	15.7	13.1	3.2	3.9	2.7	2.5	8.3	12.0	16.9	20.1	23.8	22.9	12.0
94--95	20,2	10,1	5,7	1,6	-0,9	5,3	5,8	10,8	15,7	19,2	23,6	20,5	11,4
95--96	16,4	11.3	5,7	1,4	-0,9	-2,0	2,0	12,0	18,5	20,7	20,6	21,1	10,5
96--97	11,2	10,9	7,8	0,9	-0,4	2,3	4,5	7,6	17,1	20,4	20,9	24,9	10,6
97--98	16,7	8,1	6,6	3,0	2,1	4,1	3,5	12,8	15,9	21,1	21,8	21,2	11,4
98--99	15,9	12,5	3,9	-3,5	0,0	0,8	7,0	17,0	16,3	20,5	22,3	21,3	11,1
99--00	14,4	11,0	3,7	1,0	-2,8	2,8	5,7	14,8	18,7	21,7	22,0	24,8	11,4
00--01	15,1	13,2	5,1	0,5	-2,3	3,3	10,7	9,4	17,8	18,8	22,2	22,9	11,4
01--02	15,1	13,3	3,5	-3,3	-0,8	5,6	8,3	14,1	19,4	21,5	22,4	20,3	11,6
02--03	15,7	11,4	8,5	3,4	-2,5	-4,7	4,7	10,2	20,1	22,8	24,4	24,1	11,5
03--04	15,8	8,9	7,8	1,9	-2,2	1,5	6,0	12,2	15,2	20,0	22,5	21,2	10,9
04--05	15.8	12.7	6.0	2.4	0.0	-3.3	3.4	11.4	16.8	19.7	22.1	20.3	10.6
05--06	17.5	11,0	5,0	1,3	-2,0	0,0	5,0	12,4	16,2	19,5	23,6	20.1	10,8
06--07	18,0	12,0	6,0	2,0	4,0	6,0	9,0	13,0	18,0	22,5	24,1	22,8	**13,1**
07--08	14,8	11,0	4,2	0,1	1,8	4,8	8,3	12,9	18,2	22,5	21,9	22 6	11,9
08--09	15,4	12,3	7,1	3,6	-1,1	1,4	6,6	14,7	18,0	20,1	23,2	22,9	12,0
09--10	20,0	12,3	8,3	4,3	-0,3	2,5	6,5	11,5	16,6	18,8	23,1	22,5	12,2
10-+11	16,2	9,2	9,3	0,7	-0,7	-0,9	5,5	12,2	16,5	20,5	22,1	22,7	10,9
11--12	20,3	9,8	12,5	3,5	0,7	-5,1	7,0	10,0	17,2	22,7	25,1	23,1	12,5
normal	**16.9**	**11,3**	**6,0**	**1,3**	**-1,2**	**0,6**	**5,7**	**11,5**	**16,7**	**19,6**	**21,7**	**20,8**	**10,9**

The highest average annual temperature of 13.1^0C was recorded at Timişoara in 2006/2007 agricultural year (Table 2), while the lowest annual average was 9.3^0 C at Lovrin in the year 2004/2005 (Table 3). Yearly temperature average ranged between 10.9 0C at Timisoara (Table 2) and Lovrin (Table 3), respectively 10.4 ^{0}C in Arad (tab.4).

Table 3

Monthly temperatures average, annual (1992-2012) and multianual in the range 1946-2012 (^{0} C) at weather station Lovrin

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	17.2	11.1	6.2	0.0	-0.6	-2.0	4.0	10.6	18.6	20.5	21.4	21.8	10.7
93--94	16.1	13.2	3.0	2.9	2.7	2.1	8.2	11.6	16.3	19.2	23.8	22.8	11.8
94--95	20.0	10.1	5.8	1.5	-1.1	5.5	5.3	10.5	14.8	18.7	23.5	20.9	11.2
95--96	15.3	12.3	2.8	1.7	-0.8	-2.0	2.0	11.3	18.2	21.0	20.2	20.8	10.2
96--97	13.2	11.2	8.1	0.7	-2.2	1.5	5.5	7.5	16.3	20.2	20.4	20.8	10.2
97--98	15.6	7.5	6.8	2.8	2.5	5.2	1.7	12.3	15.8	22.1	22.6	21.0	11.3
98--99	15.1	11.3	3.3	-3.4	-2.0	0.9	3.0	10.1	18.1	19.1	20.0	19.3	10.4
99--00	13.8	7.2	3.2	2.4	-1.9	2.8	3.3	11.5	17.4	23.7	18.4	26.3	10.6
00--01	15.5	12.5	8.7	0.7	-0.4	3.2	7.3	9.9	16.8	22.3	25.7	27.6	12.4
01--02	12.4	7.5	5.1	-3.0.	-1.5	4.4	1.7	5.8	16.9	23.9	30.5	22.4	10.5
02--03	13.7	8.2	7.1	-0.8	-2.8	-3.6	6.8	8.8	21.4	23.4	28.1	28.5	11.6
03--04	16.1	12.2	4.4	1	-2.7	0.0	6.9	10.2	12.7	18.4	25.2	16.0	10.0
04--05	16.3	9.2	2.9	1.9	-1.4	-4.9	1.3	11.5	12.9	16.2	22.3	23.5	9.3
05--06	17,0	10,9	5,0	2,6	-4,4	0,9	2,3	12,1	16,5	19,6	24,3	20,7	10,7
06--07	18,8	11,9	5.2	4,2	5,4	5,7	7,4	9,5	18,0	19,6	25,9	22,6	12,8
07--08	15,8	12,1	4,7	2,6	1,5	4,2	4,8	10,5	16,8	19,0	21,9	24,1	11,5
08--09	15,7	11,2	3,7	1,1	-0,8	0,3	5,3	11,3	18,5	19,3	24,3	24,6	11,2
09--10	19,5	11,5	9,9	-0,5	0,0	2,8	5,6	7,4	9,4	18,2	21,9	21,3	10,6
10--11	15,6	11,1	4,9	-1,5	0,0	-1,0	6,0	13,0	16,9	21,4	22,1	23,1	10,9
11--12	20,6	10,2	2,4	5,8	0,6	-2,1	3,0	11,8	16,6	22,5	25,0	21,7	11,5
normal	**17.9**	**11.3**	**5.4**	**1.5**	**-1.2**	**0.8**	**5.5**	**11.0**	**16.6**	**19.7**	**21.6**	**21.7**	**10.9**

Table 4

Monthly temperatures average, annual (1992-2012) and multianual in the range 1931-2012 (^{0} C) at weather station Arad

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	16,2	11,0	6,1	-0,6	-0,9	-3,1	3,2	10,4	18,6	20,3	20,9	21,6	10,3
93--94	15,3	12,7	2,9	3,6	2,8	2,1	7,6	11,3	16,3	19,5	23,7	22,7	11,7
94--95	20,4	9,7	5,4	1,2	-1,5	4,9	5,3	10,2	15,3	18,6	23,0	20,3	11,1
95--96	15,1	11,0	2,5	1,0	-1,4	-3,4	1,0	11,5	17,8	20,1	19,7	20,4	9,6
96--97	12,8	10,4	7,5	-0,1	-1,2	1,6	3,8	7,1	16,2	19,5	19,9	19,8	9,8
97--98	14,9	7,4	6,2	1,6	2,1	3,4	2,7	11,9	15,3	20,5	21,3	20,9	10,7
98--99	15,2	11,8	3,4	-4,6	-0,2	-0,1	6,3	11,9	15,9	19,9	21,9	20,6	10,2
99--00	18,1	11,1	3,7	1,0	-2,9	2,3	5,1	13,8	18,3	21,8	21,6	24,4	11,5
00--01	16,5	13,5	9,6	2,7	2,0	2,6	8,8	10,6	17,3	18,3	21,5	22,4	12,2
01--02	15,0	12,8	2,8	-4,2	-0,9	5,0	7,7	11,1	19,3	21,6	23,8	20,9	11,2
02--03	15,3	10,9	8,5	-0,1	-3,4	-5,6	4,5	10,0	20,1	22,9	22,1	24,5	10,8
03--04	16,7	8,8	7,4	1,1	-2,8	0,7	5,8	12,0	14,7	19,5	21,7	20,9	10,5
04--05	15,7	13,0	5,8	1,9	-0,6	-3,9	2,9	11,0	16,5	19,0	21,6	19,9	10,2
05--06	16,0	13,0	3,0	1,0	-1,9	-0,7	4,2	12,2	15,9	19,2	23,1	19,6	10,4
06--07	17,1	12,0	6,9	2,0	4,2	5,2	8,1	12,1	17,9	22,1	24,3	22,9	12,9
07--08	14,5	10,2	3,8	-0,4	1,1	3,2	7,0	11,7	17,1	21,8	22,1	21,7	11,1

08--09	15,0	12,0	6,6	3,3	-1,6	0,7	5,9	14,0	17,6	20,0	23,2	22,9	11,6
09--10	18,9	11,2	7,5	2,8	-0,8	2,4	6,3	11,7	16,9	19,9	22,5	21,7	11,8
10--11	15,5	8,0	8,8	0,1	-1,0	-1,3	5,6	12,1	16,4	21,0	22,2	22,5	10,8
11--12	19,8	9,8	1,9	3,2	0,7	-6,1	6,3	12,6	16,9	22,1	25,1	23,4	11,3
normal	**16,3**	**10,7**	**5,3**	**0,6**	**-1,8**	**0,8**	**5,4**	**10,9**	**16,0**	**19,0**	**20,8**	**20,2**	**10,4**

Rainfall, as the main source for soil water supply have, along with its storage capacity, a crucial role in plant growth and development, the amount of water depends primarily on rainfall, which varies from one area to another, depending on traffic barrel, and the physical and hydro-physical characteristics of the soil and some features of the landscape.

Due to cyclonic activity and moist air invasions from the west, south-west and north-west, in the western plains of Romania, respectively, Banato-Crisana Plain, quantitative precipitation are higher than in other plains of the country, of which an exception is High Plain of Vinga.

The lowest values of rainfall, annual average (500-600 mm), was recorded in the western part of the Vinga Plain, at its connection with low plains, the Galaţca Plain.

A special feature is the central and western area of Vinga High plain, where the lowest annual average rainfall value of 405.1 mm was recorded in Arad meteorological station in 1999-2000 (Tab.7) respectively 412.5 mm at weather station Timisoara in 1999-2000 (tab.5) and 331.2 mm at Lovrin weather station in 2002 - 2003 (tab. 6).

Table 5

Monthly, annual (1992-2012) and multiannual (normal) precipitation, in the range 1887 to 2012 (mm) at weather station Timisoara

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	31.0	108.6	53.2	33.1	8.1	17.7	52.2	35.5	14.9	49.8	33.8	34.5	472.4
93--94	41.0	23.2	60.8	70.5	33.2	27.7	22.3	59.6	21.9	59.6	25.0	106.4	551.2
94--95	51.3	42.5	14.9	31.2	57.8	38.0	22.4	74.5	61.5	135.9	37.0	70.1	637.1
95--96	78.3	35.5	18.7	72.5	31.5	45.0	23.5	36.0	132.5	78.6	34.0	87.5	673.6
96--97	78.7	44.5	79.5	14.0	45.6	27.0	9.0	82.5	51.7	32.7	134.5	90.3	690.0
97--98	18.7	99.4	19.6	65.3	35.9	0.2	4.6	73.3	51.7	66.1	61.5	35.0	531.3
98--99	68.7	82.0	44.0	0.0	8.5	118.0	3.5	57.0	82.5	40.0	245.0	36.0	785.2
99--00	44.0	11.0	81.0	81.0	23.0	5.0	38.0	38.0	17.5	51.0	23.0	0.0	**412.5**
00--01	27.0	0.0	15.0	37.0	36.0	4.0	58.0	64.0	18.0	121.0	95.0	23.0	615.5
01--02	144.5	18.0	70.5	58.0	8.7	10.5	7.6	47.1	53.1	74.8	62.2	98.6	653,3
02--03	48.2	52.6	42.7	66.7	47.7	69.0	26.7	10.2	46.3	51.4	80.5	55.4	597,4
03--04	66.3	113.2	31.3	22,5	60,0	40,3	18,0	59,1	66,2	34,8	45,2	76,9	633.8
04--05	55.6	62.8	127	60.8	32.3	67.8	45.5	154,4	49.8	35.1	45.2	142,4	**878.7**
05--06	84.6	25,6	20.4	88.2	30,3	41,7	49,3	78,8	50,2	87,8	50,4	98,0	705,2
06--07	24.6	17,4	31,3	21,3	26,0	92,0	57,0	4,0	68,0	65,0	46,4	65,0	518,0
07--08	62,1	53,0	86,0	23,0	45,7	22,6	78,4	59,1	58,0	172,0	45,5	24,8	730,2
08--09	51,5	17,5	53,1	55,1	27,3	24,3	48,4	22,8	44,8	111,6	41,1	31,0	528,5
09--10	4,0	10,0	106,0	42,0	65,0	76,5	31,3	56,6	122,7	131,3	24,7	81,0	751,1
10--11	40,7	40,0	48,1	74,6	23,3	28,9	30,9	21,9	64,5	28,7	63,5	35,3	500,4
11--12	10,5	29,5	0,0	11,5	49,5	65,0	6,5	81,2	40,5	38,5	113,0	10,0	455,7
normal	**46,1**	**54,8**	**48,6**	**47,8**	**40,9**	**40,2**	**41,6**	**50,0**	**66,7**	**81,1**	**59,9**	**52,2**	**629,9**

From the study of multiannual rainfall fluctuations regimes, resulting an differentiation on intervals. Thus, during the years considered rainy, rainwater excess is due to a few months (September, April, July). Other months are usually close to the annual average, some are even dry.

Table 6

Monthly, annual (1992-2012) and multiannual (normal) precipitation, in the range 1946 to 2012 (mm) at weather station Lovrin

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	20.4	89.4	46.4	42.1	5.2	7.5	40.8	47.5	21.9	10.5	46.4	70.2	448.3
93--94	40.7	18.9	45.2	74.0	31.9	30.4	23.1	51.3	28.5	83.0	29.3	87.9	544.2
94--95	45.5	99.0	9.9	36.3	53.3	33.7	23.0	65.8	90.2	77.0	27.6	30.9	592.2
95--96	72.0	8.7	34.4	80.2	48.7	19.6	24.9	20.3	117.0	70.5	36.6	38.8	571.7
96--97	80.4	30.0	64.9	22.4	33.1	8.1	8.0	61.0	44.4	51.0	76.2	59.5	539.0
97--98	13.8	76.2	17.3	64.9	46.0	1.6	1.5	42.2	48.9	81.4	91.3	72.8	557.9
98--99	88.7	72.1	38.6	4.9	19.3	55.2	5.1	47.7	71.0	100.6	179.0	71.4	753.6
99--00	22.3	34.1	69.9	63.3	8.3	1.0	42.2	28.0	20.2	20.1	25.5	19.0	353.9
00--01	8.9	0.0	1.6	17.2	37.1	11.6	75.0	97.7	99.2	149.1	76.4	12.1	585.9
01--02	121.3	13.3	56.5	4.5	3.0	25.3	4.5	2.0	51.1	44.9	54.6	85.6	466.6
02--03	70.6	42.4	46.6	79.2	38.4	1.9	0.8	12.2	25.6	37.7	44.3	2.1	**331.2**
03--04	64.1	100.6	28.4	10.4	23.7	27.2	21.3	102.0	60.6	97.9	111.2	60.2	707.6
04--05	71.1	38.6	19.9	0,0	25.6	25.5	26.4	123.3	52.0	31.4	100.5	220.4	734.7
05--06	122,4	34,5	40,8	43,9	31,4	24,5	26,5	38,4	52,4	65,0	50,1	46,2	576,1
06--07	35,7	29,8	47,9	26,8	52,2	69,3	104,5	2,1	89,7	117,5	60,8	22,0	658,3
07--08	80,8	120,5	100,1	25,7	19,4	8,9	70,4	14,2	55,5	105,0	77,6	23,0	701,1
08--09	62,9	28,8	37,6	23,5	50,1	17,8	72,9	19,3	34,3	98,9	52,4	0,9	499,4
09--10	0,9	73,7	89,8	41,7	98,5	56,9	41,5	29,5	157,7	69,3	55,7	76,7	**791,9**
10--11	80,7	22,2	72,3	71,2	14,7	5,6	30,4	13,6	36,2	19,4	89,0	14,6	469,9
11--12	13,8	36,8	15,5	0,2	7,8	55,8	32,3	126,2	64,2	27,2	59,2	3,0	442,0
normal	**36,5**	**36,0**	**43,1**	**44,5**	**31.2**	**27.5**	**28,0**	**40,6**	**51,6**	**67,0**	**54,1**	**46.1**	**506,2**

Table 7

Monthly, annual (1992-2012) and multiannual (normal) precipitation, in the range 1931 to 2012 (mm) at weather station Arad

Agricol year	Montly												Yearly
	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	
92--93	52,9	94,9	34,4	29,8	7,3	10,2	51,1	68,8	17,7	45,5	68,8	17,5	493,5
93--94	50,2	27,8	40,8	73,3	40,8	37,1	17,2	17,7	53,6	73,9	25,4	43,2	501,3
94--95	56,5	31,4	9,9	31,1	56,1	36,5	29,2	52,1	68,3	155	17,4	62,8	606,4
95--96	55,5	4,2	43,2	67,7	50,4	26,3	30,5	31,7	112,3	115	44,8	91,4	673,0
96--97	95,8	46,8	63,6	95,4	29,1	16,6	10,6	95,4	45,2	70,6	116,9	40,4	726,4
97--98	15,8	73,7	17,9	56,5	30,9	0,5	6,4	81,6	70,9	95,6	121,4	54,8	750,8
98--99	78,2	76,0	56,8	10,2	30,7	84,4	14,3	52,4	60,3	142,5	143,5	50,6	799,9
99--00	38,6	26,8	66,0	97,0	11,0	4,9	44,6	41,3	32,7	17,5	22,5	2,2	**405,1**
00--01	24,3	1,6	12,0	39,6	39,8	14,1	104,9	69,4	20,1	147,1	117,6	29,6	620,1
01--02	137,8	13,2	61,3	18,3	4,8	17,0	11,2	22,0	36,9	74,4	79,5	120,8	597,2
02--03	69,2	39,6	34,9	40,5	13,0	17,7	5,0	11,8	12,2	6,8	8,6	2,0	589,7
03--04	56,2	98,4	30,8	30,4	40,4	33,8	12,0	88,6	24,6	40,2	61,8	47,6	564,8
04--05	50,6	44,6	85,6	43,2	13,4	49,4	58,4	121	70,2	54,4	32,8	118	741,6
05--06	82,6	17,4	29,0	26,4	25,6	36,8	64,6	53,2	74,2	95,6	65,3	81,8	652,5
06--07	23,9	13,4	25,3	25,2	28,8	77,0	44,1	0,0	82,4	58,8	30,5	45,8	455,2
07--08	87,6	45,6	102,7	32,4	17,6	10,5	71,0	24,4	33,7	43,2	38,7	50,2	557,6
08--09	45,7	18,6	56,5	48,1	17,6	10,5	44,5	40,0	46,2	78,4	37,2	29,8	473,1

09--10	12,8	96,2	112,6	64,3	67,5	71,8	34,0	47,4	140,0	83,8	60,0	69,2	**859,6**
10--11	47,6	41,0	38,1	98,7	25,1	25,1	29,3	31,0	57,4	18,4	139,6	2,4	553,7
11--12	9,8	35,2	0,1	37,6	39,6	53,4	5,0	83,0	75,6	41,2	79,0	16,0	475,5
normal	**44.2**	**46.6**	**48.5**	**45.3**	**35.1**	**30.9**	**35.6**	**48.1**	**65,6**	**81.1**	**60.3**	**52.2**	**593.5**

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).

Vegetation of investigated area is strongly influenced by anthropogenic activities, pre-Roman period archaeological reported, activity that led to fragmentation of natural vegetation and replacing the large spaces with secondary vegetation and grassland crops operated as meadows and pastures.

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 170953 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 (OPREA C.V,1971).

According to the Romanian System of Soil Taxonomy (FLOREA N., 2012) 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 170953 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 identified land units 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.

In assessing the suitability of land for cultivation systems are taken into account two factors determining soil, which determine the degree of suitability, the soil texture and soil moisture excess.

Suitability estimation can be based on the information contained in existing soil surveys and land based field research conducted on soils representative of a physical geographic area.

Data provided by the literature of our country and have recently obtained information based on research conducted within the area considered emphasize that fine textured soils, with an area of 103,433.85 ha, representing 73,23% of the perimeter analyzed have low suitability for farming practice because high clay content makes it difficult to achieve an adequate state sowing, and development of plants and limit the conditions of entry on land, such as those necessary for the optimum specific work, favoring even soil compaction on reduced traffic.

The high content of clay determined during an agricultural year two extremes, namely: excessive humidity in winter and lack of moisture during the warm season, both situations resulting in a number of forms of stress (lands affected by moderate soil moisture excess on 14317.22 ha, 10,14%, strong soil moisture excess on 11948.29ha, 8,46%, lands strongly gleyed on 5952,37ha, 4,21%, lands excessively gleyed on 4138.10 ha,2,93%) with negative effects on land productivity.

When determining the structure of certain crops or tillage systems must be taken into account ability and suitability of land to cultivation and apply all the operations required in the field without causing the local stress.

Recently observations collected from field shows that the areas mentioned (in various stages of degradation) are experiencing a worrying expansion over time is being stretched farmland from year to year in an advanced stage of degradation.

But as serious as the depreciation of land quality through acidification, depletion, erosion (surface erosion on 14557,91 ha, 10,31%), landslides, subsidence (moderate compaction on 69972,84 ha, 49,54%, strong compaction on 39683.89 ha, 28,09%), dustiness, resting, etc., this is a silent crisis, insidious and not widely perceived as such, unlike earthquakes, volcanoes, floods or other natural disasters. This disaster caused by man is a gradual evolution, which induces the existence of an undue sense of safety in the food supply.

Or, in a economic integrated on continental and planetary level, the pressures faced by the land resources is not confined to one country, but on a larger experience. It is this very serious reason for studying the conditions of soil conservation, identifying causes of degradation, exhaustion and their pollution.

CONCLUSIONS

Due to its geographical position, the considered territory, at the middle of the northern hemisphere, the ecological conditions are very diverse caused by variability factors (atmospheric and cosmic-telurico-edaphic) that contribute to the achievement of the environment in which plants grow and yield crops.

Crop production can be done in the most diverse conditions: natural ecosystems, extensive or intensive agroecosystems, requires an urgent need as deep knowledge of all ecological determinants that contribute to plant growth and development.

This variability causes a variety of farming systems, the types of specialization of agricultural production and also create conditions for a given territorial concentration. At branch level, it have to ensure the complete satisfaction of the needs of agricultural products and raw materials and create export availabilities for the condition of ever-increasing demands of environmental protection.

Given a good natural ecological potential, soil quality situation is disappointing because more than a third (39.3%) of these are affected by the existence of one or more factors limiting or restrictive, the area being the subject, from the very beginning, of anthropogenic interventions more intense than in other areas of the Timis county.

Structural changes occurring in agriculture last decade and diversity of the ecopedological resources are just some of the many reasons which have made choosing this theme, taking into account the fact that a detailed knowledge of all factors and ecological determinants for each farmer can be a valuable tool application of appropriate techniques, or making of social or economic solutions that lead to a rational use of land resources, climate drought being a subject to the attention of romanian agronomists, ecologists and climatologists in the first half of the last century.

The Romanian school of pedology concept about sustainable development on the integration of animal and vegetable sector with the processing and sale of food products on the basis of active movement, in which „nothing is lost, everything is transformed''could be a sustainable and efficient solution for the future.

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