EVOLUTION OF SOME COMPONENTS OF ECOSYSTEMS PRODUCTIVITY FROM DUMBRAVA, TIMIS COUNTY

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Abstract

Research goal is to accumulate scientific data on development of components of agricultural land productivity, necessary to support of an methodology of their quality evaluation through a complex firm approach to physical and geographical conditions from Banat Plain. Research on the main physical and chemical characteristics of soil have been taken by many scientists, in the country and abroad, since the beginning of last century and the German classification system was designed mainly based on soil texture in the so-called phase of its evolution. The objectives and activities fall within the current agricultural research and agricultural practice, on international and national level, for the study of the importance of hydro-physical characteristics of the edaphic coating in substantiation of tillage systems. Researches are in the line of grounding of a system of sustainable agriculture and the main objective of proposing highlighting quantitative and qualitative changes that occur in the agricultural ecosystem in application to wheat and corn, in this paper are presented the influence of fertilizers (NPK and MgO) on maize, in the climatic conditions of the 2012-2013 agricultural year. The experiences are placed on a Luvisol stagnic albic medium clay / clay loam, in the experimental field of OSPA Timisoara field, representative for of Făget Depression. The physical and chemical properties of soil samples (texture, pH, content of humus and N,P,K), were analyzed in USAMVB-OSPA Timisoara Research Laboratory, after national norms and standards approved by the Standards Association from Romania (ASRO). The research of the ecopedologic conditions was made according to "The methodology of elaborating of pedological studies", vol. I, II and III elaborated by the ICPA Bucharest in 1987, completed with specific elements from the Romanian System of Taxonomy of Soils (SRSTS-2012). Importance, originality and timeliness of work is the need to protect the edaphic layer and environmental protection by: The accumulation of scientific data necessary to support technologies of consevative tillages and sustainable management of soil and water resources, Implementation of conservative tillages and sustainable management of physical, geographical and edaphic conditions from Banat Plain.

Keywords: *component, soil, moisture, productivity, luvisoil.*

INTRODUCTION

Knowledge of natural conditions and ecological features of the proposed area of land for various utilities and some cultures have an important economic and social importance for both the big and the small farm producer.

In this context, the major directions of the Romanian school of Pedology (CANARACHE AND TEACI, 1980, CÂRSTEA, 1995 , TEACI 1995,MUNTEANU 2000) on the unitary research of land to meet the needs of sustainable agriculture and environmental protection, will have to solve in order to connect to the European system, in full accordance and harmony earth following specific functions such as: environmental, economic, technical, social and legal functions.

Based on these considerations, the authors try to present in this paper, based on data extracted from scientific research topics and an impressive volume of data collected from the archive OSPA Timisoara, some aspects of soil quality status and evolution of the main factors that contribute to its realization.

MATERIALS AND METHODS

Researches are in the line of grounding of a system of sustainable agriculture and the main objective of proposing highlighting quantitative and qualitative changes that occur in the agricultural ecosystem in application to wheat and corn, in this paper are presented the influence of fertilizers (NPK and MgO) on maize, in the climatic conditions of the 2012-2013 agricultural year.

The experiences are placed on a Luvisol stagnic albic medium clay / clay loam, in the experimental field of OSPA Timisoara field, representative for of Făget Depression.

In the field, the experience was organized by 7 variants in four repetitions, with a size of 21 m^2 for each experimental variants.

The biological material used was PR 39 D 81 hybrid. The sowing was done in late April (30.04.2013), using a density of 48.000 germinable seeds per hectare and the harvest was made on 20.10.2013.

Fertilizers used in the experiment were given according to the application received from INCDPAPM Bucharest, namely:

Fertilizer	**Base**	**Treatment 1**	**Treatment 2**
Ammonium nitrate	Before sowing		
DAP	Before sowing		
Korn-Kali	Before sowing		
Kieserit	Before sowing		
EPSO Combitop		4-leaf stage	10-leaf stage

Guardian herbicide was use with a dose of 1 l / ha before sowing, the second herbicide is performed with Buctril, 1 l / ha, in phenological phase of 4-6 leaves. There have been two mechanical hoeing.

The experimental variants were as follows:

Variant	**Fertilizers**	**N**	**P_2O_5**	**K_2O**	**MgO**
		Kg/ha			
V_1	Control	0	0	0	0
V_2	N	160	0	0	0
V_3	NP	160	90	0	0
V_4	NPK - Korn-Kali	160	90	200	0
V_5	NK- (Korn-Kali)	160	0	200	30
V_6	NK- (Korn-Kali)+Kieserit	160	0	200	30+50
V_7	NK- (Korn-Kali)+Kieserit+ EPSO Microtop	160	0	200	30+50+4,5

The research of the ecopedologic conditions was made according to "The methodology of elaborating of pedological studies", vol. I, II and III elaborated by the ICPA Bucharest in 1987, completed with specific elements from the Romanian System of Taxonomy of Soils (SRTS-2012).

To achieve objectives, the research were oriented towards both observations and measurements made in the field and experimental validation of these findings by laboratory analysis.

RESULTS AND DISCUSSION

The teritory of Dumbrava is located in the depression between the Zarand mountains and Poiana Rusca mountains, at the limit of the passage between Lipova Plateau and Western Plain piedmont.

From genetical point of view, the studyed area is characterized by an accumulative relief piedmont consists of Pliocene fluvial deposits.

The morphogenetic processes are determined mainly by the action of existing hydrographic network and present the appearance generated a hilly terrain with altitudes values ranging from 135 to 308 m (ROGOBETE AND ŢĂRĂU 1997).

Overall, the landscape presents a general rise from northeast to southwest. In cross section, the relief descends from north to south through terraces of different generations.

Framed between Poiana Rusca and Zarand mountains, wide depression postechtonic-Mures depression has evolved under the influence of Pannonian area, the geology of the region is closely related to the sinking of the area into the lower Tortonian.

The foundation of the area consists of Mesozoic crystalline fractions of mountainous areas, border formations contributed to filling the Pannonian basin from east to west to occupying successively tortoniene deposits, Pleistocene and Quaternary then.

It followed the ransformation of fillings piedmont plain fluvial accumulation, helping to shape the hydrographic relief.

Dumbrava territory is part of Bega catchment, river which crosses the territory. Bega flow is permanent, but inconsistent (with peaks in spring and late summer minimum).

From climate perspective Lugoj-Faget area is characterized by an annual average air temperatures of 10.8 ° C (Table 1) and an amount of rainfall (annual average) to 679.9 mm (Table 2).

Table 1

The average monthly temperature, annual and multi-annual in period of 1980-2013, at Lugoj (mm)

Agricultural year	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	Annual
10-11	15,8	9,1	10,1	1,0	- 0,6	-0,7	6,1	12,4	16,0	20,4	22,0	22,1	11,1
11-12	19,3	9,6	2,3	3,3	0,2	-5,2	6,3	13,1	16,8	22,3	25,2	22,5	11,3
12-13	19,3	12,0	8,6	0,4	1,6	4,5	5,5	13,0	17,9	20,1	21,9	23,1	12,3
Normal	**16,3**	**11,2**	**5,7**	**1,3**	**-0,4**	**0,9**	**5,8**	**11,3**	**16,4**	**18,9**	**21,5**	**21,1**	**10,8**
Differences													
10-11	-0.5	-2.1	+4.4	-0.3	-0.2	-0.2	+0.3	+1.1	-0.4	+1.5	+0.5	+1.0	+0.3
11-12	+3.0	-1.6	-3.4	+2.0	+0.6	-4.3	+0.5	+1.8	+0.4	+3.4	+3.7	+1.4	+0.5
12-13	+3.0	+0.8	+2.9	-0.9	+1.2	+3.6	-0.3	+1.7	+1.5	+1.2	+0.4	+2.0	+0.5

Table 2

The monthly, annual and multi-annual precipitation at Lugoj (mm)

Agricultural year	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	Annual
10-11	25,4	25,9	39,5	68,3	30,5	40,7	22,7	31,1	51,8	37,6	122,1	7,0	502,6
11-12	15,9	23,7	0,0	38,6	73,8	55,9	11,7	72,2	70,3	28,5	84,6	29,0	503,9
12-13	37,0	63,3	22,8	86,7	35,4	32,7	101,5	56,3	48,3	83,3	62,3	44,1	673,7
Normal	**53,5**	**48,8**	**49,8**	**61,7**	**48,5**	**40,6**	**41,5**	**62,1**	**68,1**	**84,6**	**62,0**	**58,7**	**679,9**
Differences													
10-11	-28.1	-22.9	-10.3	+6.6	-18.0	+0.1	-18.8	-31.0	-16.3	-47.0	+60.1	-51.7	-177.3
11-12	-37.6	-25.1	-49.8	-23.1	+25.3	+15.3	-29.8	+10.1	+2.2	-56.1	+22.6	-29.7	-176.0
12-13	-16.5	+14.5	-27.0	+25.0	-13.1	-7.9	+60.0	-5.8	-19.8	-1.3	+0.3	-14.6	-6.2

The average amount of rainfall would provide favorable conditions for most crops in the area, if they have a corresponding distribution on months, or phenol-phases of vegetation.

Rainfall in summer and the winter, have the same ratio value, but the differences were more pronounced in summer to the cold, the most pronounced differences were recorded in the spring and the early summer months ie rainy when cyclone activity is higher.

To assess the impact of weather conditions on land productivity, the data were recorded in both stationary fot significance compared with rainfall (reference limits in relation to the requirements of agriculture (tab. 3) using data from the Agroclimatic Resources of Timis county (Berbecel, 1979).

Table 3

The significance of rainfall
(the reference limits range with the agriculture requirements)

Interval	Semnification of rainfall quantityes				
	Very dry	Dry	Satisfactory	Optimal	Excedentary
September-octomber	Under 40	41-60	61-80	81-150	Over 150
November-march	Under 100	101-150	151-200	201-300	Over 300
April	Under 20	21-30	31-40	41-70	Over 70
May-july	Under 100	101-150	151-200	201-300	Over 300
Annual	Under 350	351-450	451-600	601-700	Over 700

The analysis of rainfall data from the 2012-2013 agricultural year, the year was optimal (Table 4), it being situated within optimal values in terms of characteristic values recorded during the interval except from May to July, when these values were within the limit of satisfactory values.

Table 4

The significance of rainfall
range with the agriculture requirements, from 2010-2013 period, at Lugoj

Agricol year	Characteristic intervals									
	IX-X	Semnif.	XI-III	Semnif.	IV	Semnif.	V-VII	Semnif.	Anual	Semnif.
10-11	51,3	Dry	194,2	Satisfactory	31,1	Satisfactory	211,5	Optimal	502,6	Satisfactory
11-12	39,4	Very dry	179.7	Satisfactory	72,2	Excedentary	183.4	Optimal	503.9	Satisfactory
12-13	100,3	Optimal	279,1	Optimal	56,3	Optimal	193,9	Satisfactory	679,9	Optimal

In close conjunction with various geomorphological factors that determine the existence of varied landscape units, those geo-lithological leading to a great diversity of parental material and the climate or the hydrological and the various human interventions, resulted in a large population of soils with specific characteristics (related or completely different from each other) evolving, but prevailing are Albic luvisols in different degrees of stagnogleyzation.

The experiences are on a albic-stagnic luvisol, silty loamy / loamy clay with profile type: Ap- Atp -Ea – Bt - Btz – BCy - Czy (tab.5) in the experimental field of OSPA Timisoara.

Pedogenesis processes are specific to soils in the deciduous forests with grainy structure in Ao horizon of relatively small thickness (15-20cm), with a significant migration of clay and iron hydroxides and the formation of a El or Ea horizon, over a Bt horizon (argic), strong to excessively difference textural, under woody vegetation represented by Quercineae (thermophilic) mixed with deciduous trees.

According to WRB-SR, 1998, luvisols are soils whose essential features are textural differentiation (the presence of argic diagnostic horizon), high ability of clay to cationic change, base saturation >50% and low saturation of aluminium (ŢĂRĂU ET ALL. 2002).

Argic horizon may color from brown to reddish brown depending on the nature of iron compounds resulting from pedogenesis processes.

Regarding the main physical and hydro-physical characteristics of the analyzed soil, it has a silty loamy texture in upper horizons (Ap-Atp-Ea) located in the first 50 cm of the profile, a clay loamy texture in transition horizon (EB) of about 14 cm and loamy clay in whole soil profile, in the range 54-196 cm (tab.5).

Table 5

Physical, hydro-physical and chemical properties of the Albic-stagnic Luvisol, strongly stagno-gleyed, silty loamy / loamy clay, on fine eluvial material

Indices	Depth (cm)								
	0-18	-28	-40	-54	-70	-92	-110	-143	-196
Horizonts	Apw_2	Atp w_3	Ea w_4	EB w_4	Bt w_5	Bt z w_5	BCy w_3	CBy w_2	Czy
Coarse sand (2.0 – 0.2 mm)	6,2	7,0	4,7	1,8	1,1	1,5	1,3	1,7	1,0
Fine sand (0.2 – 0.02)	27,3	28,4	25,3	21,2	18,9	27,4	18,5	19,9	20,1
Silt (I + II) (0.02-0.002 mm)	39,8	38,2	37,5	32,1	20,7	15,7	29,5	28,1	27,8
Coloidal clay (sub 0.002)	26,7	26,4	32,5	44,9	59,3	55,4	50,7	50,3	51,1
Phisical clay (praf II +arg col)	45,5	44,6	50,2	59,8	70,0	67,0	64,9	63,4	64,0
TEXTURE	LP	LP	LP	TT	AL	AL	AL	AL	AL
Specific Density (Ds)	2,69	2,69	2,70	2,72	2,72				
Aparent density (Da)	1,55	1,70	1,54	1,59	1,59				
Total phorosity (Pt)	45,00	37,00	43,00	42,00	42,00				
Aeration phorosity (Pa)	17,10	1,30	10,66	8,61	0,66				
Degree of compaction (GT)%	7,00	25,00	11,00	20,00	24,00				
Higroscopical coefficient(CH)	4,76	6,20	6,20	6,20	10,00	10,00	10,00		
Fadind coefficient (CO)	7,13	9,30	9,30	9,30	15,00	15,00	15,00		
Field capacity (CC)	18,00	21,00	21,00	21,00	26,00	26,00	26,00		
Utile water capacity (CU)	10,87	11,70	11,70	11,70	11,00	11,00	11,00		
Total capacity (CT)	29,04	21,77	27,93	26,42	26,42				
pH in water	5,79	5,26	4,76	4,77	5,22	5,60	6,45	6,75	6,78
Carbonates ($CaCO_3$)	0,00	0,00	0,00	0,00	0,00	0.00	0,00	0,00	0,00
Saturation in base degree (V)	48,09	29,86	30,13	39,45	52,37	67,77	85,65	90,96	90,96
Humus	2,09	1,98	1,30	0,70					
Nitrogen index (IN)	1,01	0,59	0,39	0,28					
Humus reserve (50 cm)	58,32	33,66	18,48	11,13	**111,36**				
P mobile	10,68	15,35	7,31	3,18	3,00	1,40	2,00	3,30	3,30
K mobile	45,00	43,00	31,00	82,00	81,20	111,60	81,20	56,60	56,60

Granulometric composition is characterized by the clay content that increases from 26.4% (in Atp) to 59.3% (Bt) and then gradually decreases on soil profile.

Bulk density (g/cm3) have very high values throughout the soil profile, except the processed layer (Ap) in the range 0-18 cm that showing high values.

Total porosity (PT%) show medium values in processed layer (Ap) or 0-18 cm, very low between 18-28 cm and low between 28-70 cm and aeration porosity (PA%) medium values in processed layer (Ap), very small between 28-54 cm and extremely low in Atp (18-28 cm), respectively Bt (54-70 cm).

From chemical characteristics that influence the composition and the way of life of phyto-coenosis and have an important role on soil fertility, are important: soil reaction, the reserve of humus and nutrients insurance, etc. status (DUMITRU ET ALL. 2000).

The analyzed soil have a moderately acid reaction (pH) in the range 0-28 cm, strongly acid between 28 and 54 cm, moderately acidic between 54-92 cm and weakly acidic between 92-196 cm, respectively at the base of soil profile.

Nitrogen index (IN) has medium values in 0-33 cm layer and low values on depth. Humus reserve (t/ha) in 0-50 cm layer is low (111.36).

Nutrient supply status indicates a small mobile phosphorus content (ppm) in the surface horizon of 0-28 cm, very little between 28-40 cm and extremely low between 40-196 cm, a very low content of mobile potassium (ppm) between 0-40cm and small between 40-196 cm, whereas nitrogen index (NI) record low values.

Regarding the evolution of soil moisture, the observations (through soil sampling and laboratory determinations) in the two cultures have highlighted a number of issues on how to achieve the ecological functions of soil in agro-ecosystems, namely those related to main features embedded in the concept of eco-pedologic profile.

By comparing the values thus obtained with values of field capacity (CC mm) can be determined accurately the excedent or deficit of soil moisture and then how to bring optimum soil moisture values.

In 212-2013 agricultural year, the soil being kept as a field crop establishment, humidity values were kept near field capacity until the beginning of August when they recorded values below those of useful water capacity both on the range 0-10 cm and the range of 10 to 25 cm (table 6).

Its values generally ranging between field capacity and useful water capacity, but there are times when they have exceeded the field capacity between 0-10 cm and 50-75cm (table 6).

Based on the measurements performed, that the momentary humidity (U%) and density (DA g/cm3) was calculated with the water supply (W mm) of the profile depth intervals, or 0-10 cm, 0-25 cm, 0-50 cm (Tab.7) and the interval 0-100 cm, 50-100 cm 0-125 cm (tab.8). By comparing the values thus obtained information with field capacity (CC mm) can be determined with a precision the excedent or deficit of soil moisture, and then how to bring optimum soil moisture values.

Table 6

Soil water reserve (U%) compared with useful water capacity values (CU%), in 2012-2013 agricultural year

Location		Interval 0-10 cm				Interval 10-25 cm				Interval 25-50 cm			
		U%	CC%	CU%	Difference from CU%	U%	CC%	CU%	Difference from CU%	U%	CC%	CU%	Difference from CU%
Dumbrava Maize	19.09.2012	8.33	18.00	10.87	-2.54	7.54	21.00	11.70	-4.16	7.83	26.00	11.00	-3.17
	17.10.2012	19.54	18.00	10.87	+8.67	13.93	21.00	11.70	+2.23	14.01	26.00	11.00	+3.01
	07.11.2012	**25.65**	18.00	10.87	+14.78	20.60	21.00	11.70	+8.90	17.25	26.00	11.00	+6.25
	01.02.2013	**24.83**	18.00	10.87	+13.96	20.26	21.00	11.70	+8.56	23.63	26.00	11.00	+12.63
	21.03.2013	**29.12**	18.00	10.87	+18.25	**33.81**	21.00	11.70	+22.11	25.70	26.00	11.00	+14.70
	19.04.2013	**21.46**	18.00	10.87	+10.59	**22.87**	21.00	11.70	+11.17	25.65	26.00	11.00	+14.65
	15.05.2013	**19.76**	18.00	10.87	+8.89	18.60	21.00	11.70	+6.90	20.25	26.00	11.00	+9.25
	07.06.2013	**26.39**	18.00	10.87	+15.52	**21.16**	21.00	11.70	+9.46	**27.89**	26.00	11.00	+16.89
	17.07.2013	14.85	18.00	10.87	+3.98	13.60	21.00	11.70	+1.90	15.71	26.00	11.00	+4.71
	06.08.2013	10.35	18.00	10.87	-0.52	11.55	21.00	11.70	-0.20	14.05	26.00	11.00	+3.05
	19.08.2013	7.29	18.00	10.87	-3.58	11.00	21.00	11.70	-0.70	14.72	26.00	11.00	+3.42
Location		Interval 50-75 cm				Interval 75-100 cm				Interval 1 00-125 cm			

		U%	CC%	CU%	Difference from CU%	U%	CC%	CU%	Difference from CU%	U%	CC%	CU%	Difference from CU%
Dumbrava Maize	19.09.2012	19.64	26.00	11.00	+8.64	17.47	26.00	11.00	+6.47	15.56	26.00	11.00	+4.56
	17.10.2012	18.85	26.00	11.00	+7.85	19.13	26.00	11.00	+8.13	20.57	26.00	11.00	+9.57
	07.11.2012	18.95	26.00	11.00	+7.95	18.38	26.00	11.00	+7.38	19.16	26.00	11.00	+8.16
	01.02.2013	25.93	26.00	11.00	+14.93	25.72	26.00	11.00	+14.72	25.06	26.00	11.00	+14.06
	21.03.2013	**26.95**	26.00	11.00	+15.95	**32.22**	26.00	11.00	+21.22	**31.74**	26.00	11.00	+20.74
	19.04.2013	**30.84**	26.00	11.00	+19.84	**28.15**	26.00	11.00	+17.15	**27.75**	26.00	11.00	+16.75
	15.05.2013	21.37	26.00	11.00	+10.37	23.15	26.00	11.00	+12.15	23.65	26.00	11.00	+12.65
	07.06.2013	**27.45**	26.00	11.00	+16.45	25.75	26.00	11.00	+14.75	23.42	26.00	11.00	+12.42
	17.07.2013	**26.32**	26.00	11.00	+15.32	22.63	26.00	11.00	+11.63	20.62	26.00	11.00	+9.62
	06.08.2013	18.95	26.00	11.00	+7.95	21.55	26.00	11.00	+10.55	19.79	26.00	11.00	+8.79
	19.08.2013	18.32	26.00	11.00	+7.32	21.20	26.00	11.00	+10.20	19.07	26.00	11.00	+8.07

Table 7

Soil water reserve (mm) compared with the values of field capacity (CC)

Location		Interval 0-10 cm			Interval 10-25 cm			Interval 25-50 cm		
		Water reserve (mm)	CC (mm)	Difference (mm)	Water reserve (mm)	CC (mm)	Difference (mm)	Water reserve (mm)	CC (mm)	Difference (mm)
Dumbrava Maize	19.09.2012	11.95	27,54	-15.59	26.38	73,53	-47.15	76.56	162,58	-86.02
	17.10.2012	35.39	27,54	+7.85	81.51	73,53	+7.98	121.03	162,58	-41.55
	07.11.2012	37.73	27,54	+10.19	82.78	73,53	+9.25	144.64	162,58	-17.94
	01.02.2013	37.99	27.54	+10.45	82.36	73.53	+8.83	163.29	162.58	+0.71
	21.03.2013	44.55	27.54	+17.01	118.59	73,53	+45.06	206.61	162.58	+44.03
	19.04.2013	32.83	27,54	+5.29	82.92	73,53	+8.83	170.77	162.58	+8.19
	15.05.2013	30.23	27,54	+2.69	70.96	73,53	-2.57	140.32	162,58	-22.26
	07.06.2013	40.38	27,54	+12.84	86.72	73,53	+13.19	182.24	162,58	+19.66
	17.07.2013	22.72	27,54	-4.82	52.50	73,53	-21.03	106.31	162,58	-56.27
	06.08.2013	15.84	27,54	-11.70	41.13	73,53	-32.40	89.25	162,58	-73.33
	19.08.2013	11.15	27.54	-16.39	35.24	73.53	-38.29	85.66	162.58	-76.92

Table 8

Soil water reserve (mm) compared with the values of field capacity (CC)

Location		Interval 0-100 cm			Interval 0-125 cm			Interval 50-100 cm		
		Water reserve (mm)	CC (mm)	Difference (mm)	Water reserve (mm)	CC (mm)	Difference (mm)	Water reserve (mm)	CC (mm)	Difference (mm)
Dumbrava Maize-	19.09.2012	201.07	366.03	-164.96	263.31	470.03	-206.72	145.00	203.45	-58.45
	17.10.2012	257.01	366.03	-109.02	339.29	470.03	-130.74	148.62	203.45	-54.83
	07.11.2012	289.55	366.03	-76.48	366.19	470.03	-103.84	146.12	203.45	-57.33
	01.02.2013	365.35	366.03	-0.68	465.59	470.03	-4.44	202.06	203.45	-1.39
	21.03.2013	438.57	366.03	+72.54	565.53	470.03	+95.50	231.96	203.45	+28.51
	19.04.2013	401.33	366.03	+35.30	512.33	470.03	+42.30	230.56	203.45	+27.11
	15.05.2013	314.66	366.03	-51.37	409.26	470.03	-60.77	174.34	203.45	-29.11
	07.06.2013	390.24	366.03	+24.21	483.92	470.03	+13.89	208.00	203.45	+4.55
	17.07.2013	297.50	366.03	-68.53	379.98	470.03	-90.05	191.19	203.45	-12.26
	06.08.2013	247.93	366.03	-118.10	327.09	470.03	-142.94	158.68	203.45	-44.77
	19.08.2013	240.53	366.03	-125.50	316.81	470.03	-153.22	154.87	203.45	-48.58

The yields obtained were statistically assured, in the agricultural year 2012-2013 the climatic conditions have negatively influenced the soil moisture regime, and especially the production obtained.

The maize yield ranged from 3264 kg - 4994 kg / ha. In the control was obtained 3264 kg, the highest yield of 4994 kg was obtained with NK- (Korn-Kali) variant + Kieserite + EPSO Microtop (tab.9).

Table 9

Influence of fertilizers with nitrogen, phosphorus, potassium and magnesium on the production of maize on a luvosol albic-stagnic, from Dumbrava, Timis county, in 2013

Variant	Yield kg/ha	Differences kg/ha	%	Semnification
Control	3264	-	100	-
N	3758	494	115	**
NP	3875	611	119	***
NPK-Korn-Kali	4441	1177	136	***
NK- Korn-Kali	4344	1080	133	***
NK- Korn-Kali +Kieserite	4525	1261	139	***
NK- Korn-Kali +Kieserite+ EPSO Microtop	4994	1729	153	***

DL 5% 310
1% 425
0.1% 579

The application of a dose of N160 determined an increasing of production with 494 kg / ha (115%). Applying N160P90 fertilizer, the production increase with 611 kg / ha, 119%. The variant where was aplyed N160P90K200 (NPK - Korn-Kali) production obtained was 4441 kg / ha, an increase about 1177 kg / ha, respectively 136%.

The NK-variant (Korn-Kali) the growth was only 1080 kg / ha, respectively 133% and NK-variant (Korn-Kali) + Kieserite obtain a bonus 1261 kg / ha, or 139%, the highest yield was obtained at the NK-(Korn-Kali) + Kieserite + EPSO Microtop of 4994 kg / ha, respectively 153%.In all variants tested which were administered potassium fertilizer, the obtained production are very significant differences compared to the control. Also, the variants which were administered potassium fertilizer + Kieserite, the yield were increased compared to other variants.

CONCLUSIONS

Periodic determination of soil moisture in the investigated area are in line of the concerns in the field, both nationally and globally, in the context of climate change from the last decades.

Based on the measurements performed, that the momentary humidity (U%) and bulk density (g/cm^3), was calculated the water supply (W mm) for each depth interval of the ecopedologic profile, respectively: 0-10 cm, 0-25 cm, 0-50 cm, as well as the intervals 0-100 cm, 0-125 cm and 50-100 cm.

Values thus obtained could be compared with values of field capacity (CC mm) and it can be determined accurately the excedent or the deficit of soil moisture and how to bring the optimal soil moisture.

Regarding the evolution of soil moisture, the observations (through soil sampling and laboratory determinations) in the two cultures revealed a number of issues on how to achieve the ecological functions of soil in the agroecosystems, namely those relating to main hydro-physical characteristics (determined by morphological, physical, chemical and mineralogical) under the integrated concept of ecopedological profile.

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