PEDOLOGICAL FACTORS AND ZONAL PARTICULARITIES OF TIMIŞ COUNTY

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Abstract: *Approached issues refer to a 869665 ha area of which 700477 ha of agricultural terrains. Vegetation growing conditions (with hard impact on terrain production), together with environmental factors soil characteristics, represent a majour component with multiple manifestations due not only to its own proprieties but also to its depositing capacities for other environement factors influence. We briefly present physical and geographical characteristics of this zone , their edaphic cover structure and specific features of each zone, respectively their favourability regarding main crops in natural or anthropically modified conditions. This paper presents main aspects refering to the zonal and microzonal character of agriculture, definitory and decisive determinant factors of terrain productive capacity, present and potential ecologic favourability, dynamic character of yield as an expression of a certain development stage and of weather phenomena in the territory. As agroecosystems element, the soil may favour productivity through a range of defined specific properties, such as: quantity, quality, equilibrium of nutritive elements, thermic and hydric regime, mineralogic composition, etc. These factors cognition present a considerable practical and theoretical importance. The soil types characterised and defined and identified within main fisical and geographical units of Timis County , constituted basic elements in zones , microzones defining and the main areas agroeconomic. Areas of agroeconomic groups administrative and cadastral territories farms based on element similar on the sensitive: the conditions of relief, climate, soils, introduction of irrigation technique and equipment (inland communications, food, etc.), traditional agricultural activity, and also the profile of the territories considered in so far as it meets the criteria on the achievement of a sustainable development perspective. The research of eco-pedological conditions, ordering and processingof dates was done in accordance with Development Methodology of Soil Studies (Vol I, II, III), developed by ICPA Bucharest in 1987 and the Romanian System of Soil Taxonomy (SRTS-2012).*

Key words: *zonal, factor, agricultural, pedological, agroeconomic,*

INTRODUCTION

The base of cadastral land evaluation, as an expression of capital size, is the vocation of land expressed throught their intake of certain opportunities that you get to create profits, profitability in the use of various agricultural or forestry land is differentiated in time and space.

The awareness on natural conditons and especially on ecological potential of arable terrains has a particular importance in the achievement of soil qualification zones. Thus , gives us sugestion on on crop priorities , structures , potential yields .

Through its role and functions the agriculture is a great user of natural resources having a random impact on environment and who depends, due to its long-term variability, on the long-term resource existence.

Presenting specific socio-economic attributes, the earth is an object of interdisciplinary research (soil, economy, land, etc.), defining it both as a means of production and object of human activity.

Agricultural land operating through the use of incomplete or incorrect strategy seriously affects both quantitatively and qualitatively not only production (agricultural, forestry, fisheries, etc.) but also soil resources.

Starting with this consideration , the authors of this paper , present, (based on data issued from pedological and agrochemical studies , from OSPA Arad archive and from research themes) , the relations between present and potential yield for main crops , and for different zones (plain , hill and mountain.) . This elements found technically and scientiffically the most adequate measures for durable utilization of soil resources .

MATERIAL AND METHODS

The addressed issues is relating to an area of 869665 ha, of which 700477 ha (80,54 %) agricultural terrains (table 1) , located in western Romania and representing a total of 89 cadastral territories (figure1).

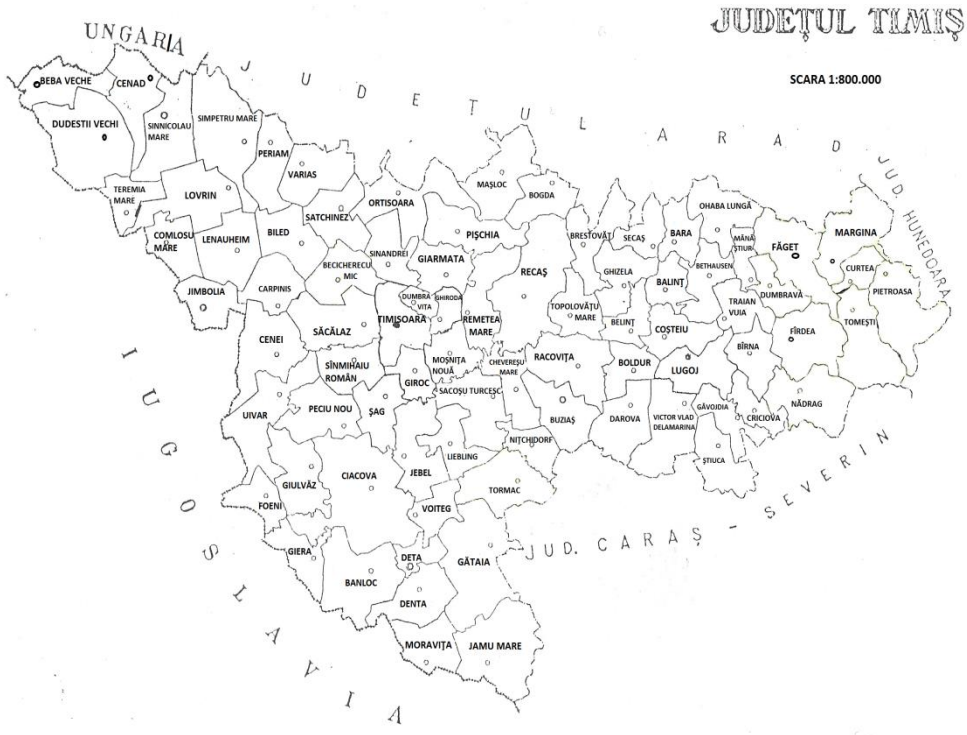

Figure 1. The structure of the administrative territorial units of the Timiş county.

The natural conditions of researched area are generally favorable for agro-alimentary sector development, under all the aspects, being an old tradition for cereal cultivation and valorization, especially by animal breedind.

Table 1

Surface structure by main categories of use

Specification	Arable	Pastures	hayfields	Vineyards	Orchards	Agricultural	Total
Timis (ha)	531593	125684	29497	4457	9246	700477	869665
%	75,89	17,95	4,21	0,63	1,32	100,00	
%	61,13	14,45	3,39	0,51	1,06	80,54	100,00

The examination of ecopedological 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, Romanian Taxonomic System of Soils Taxonomy (SRTS-2012), and land resources structure (31.12.2006) statistical raport (after O.J.C.G.F. Timisoara).

RESULTS AND DISCUSSION

Timiş county in the area of 8678 km ^{2} is placed in the western part of Romania between the coordinates 20 ° 16 ' (Beba Veche) and 22 ° 23 ' East longitude (Poieni), 45 ° 11 ' (Lăţunaş) and 46 ° 11 ' North latitude (Cenad).

Through its geographical position, Timiş county has a significant role in the determination of the ecological conditions and the vocation of a certain portion of land for certain utilities (agricultural, forestry, socio-economic, etc.).

Timis county relief is characterized by a great variety of landforms, generally relate to the genesis and evolution of the Carpatho-Danubian whole relief. In the morphology of hills and mountainsTimis county we can see distinct sectors (Figure 2):

- eastern sector, the highest, made of northern branches of Poiana Rusca Mountains,
- the central sector, consists of hills and Piedmont plains,
- the western sector, the lowest altitude in the lower Plains, subsidence and meadows

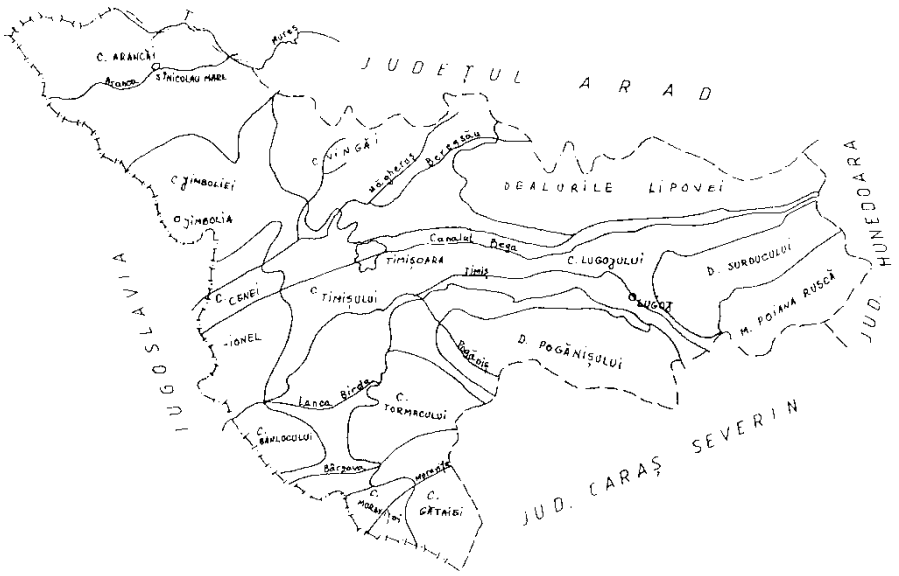

Figure 2. The main physico-geographical units of Timiş county

The macroclimatic conditions of Timis county determined by its geographical position in the European continent, movement determined by centers of termical action (Azores and the subtropical anticyclone), or seasonal thermal action centers (Siberian, Asian, or the Mediterranean anticyclone), print out this area a temperate continental climate with subtropical influences more or less pronounced in certain geographic areas.

Thus, landscape features and climatic conditions have allowed the arable land to hold about 75,89% of the agricultural area, 700477 ha (table 2), being represented in the major landforms, with the following proportions: 55,30 % meadow and low plains, 34,70% high plains and terraces , 8,7% in hills and 1,30 % in mountains.

The lands with pastures occupy a share of 22,15%, their spread in the major landforms (28,90 % meadow and low plains, 18,50% high plains and terraces , 27,80 % in hills and 24,80 % in mountains).

Table 2

The distribution of land use categories in the main landforms

Relief	Arable		Pastures and hayfilds		Vignards and orchards		Agriculture	
meadow and low plains	ha	293971	ha	44848	ha	247	ha	338330
	%	55,30	%	28,90	%	1,80	%	48,30
high plains and terraces	ha	184463	ha	28708	ha	1315	ha	214066
	%	34,70	%	18,50	%	9,60	%	30,56
Hills and terraces	ha	46249	ha	43140	ha	11278	ha	101149
	%	8,70	%	27,80	%	82,30	%	14,44
Mountains and lowlands	ha	6910	ha	38485	ha	863	ha	46932
	%	1,30	%	24,80	%	6,30	%	6,70
Total	ha	531593	ha	155181	ha	13703	ha	700477
	%	75,89		22,15		1,96		100

From the data, we can see that diversity of climatic conditions and specific characteristics of the space considered had a strong influence on the structure of the land and how land use in general and particularly agricultural land (default on their current and future productivity).

In this regard, one very important issues that have concerned,and will work concerns many scientists (biologists, pedologyst, agronomists, chemists, geneticists, geography, etc.) is the development and application in production of technologies capable of providing the highest returns in terms of consumption as low (energy).

This goal in turn requires a detailed knowledge of organic supply, generically defined as the total energy of a variety of means structural complexity necessary genesis, development and maintenance of abiotic and biotic systems, by creating a harmonious balance between soil and plant breeding and their protection.

In the context of presented data, the productivity of agricultural land, as a result of diversity of the physical and geographic conditions and intrinsic characteristics of the soil and the human interventions occurring over time, is much different in time and space.

As a consequence, soil cover fundamental geographical characteristics in our research area follows the same step distribution as relief or climate. Pedogenetic factors interaction generate a numerous soil population with evolving specific characteristic.

Accordingly to Romanian Soil Taxonomy System (SRTS 2012) we identified in our area 8 classes and 17 Soil Types (table 3) in which we discriminate numerous detailed cathegories.

Table 3

Main types and soil associations in Timis County,
(hectares and percentage of agricultural terrain)

Nr crt	SRTS 2012	SRCS 1980	WRB-SR 1988	TIMIŞ	
				Ha	%
1	Litosol şi folisol (di,eu,pr,rz)	Litosol	Leptosol	9806	1,40
2	Regosol (di,eu,mo,um,li)	Regosol	Regosol	22415	3,20
3	Psamosol (eu,mo,gc,)	Psamosol	Arenosol	210	0,03
4	Aluviosol (en,eu,mo,gc,vs,sc,ac)	Protosol aluvial Sol aluvial Coluvisol	Fluvisol	29071	4,15
	P r o t i s o l u r i	Soluri neevoluate		**61502**	**8,78**
5	Cernoziom (ti, gc, ka,vs, sc,ac)	Cernoziom Cernoziom cambic	Chernozem	186677	26,65
6	Faeoziom (ti,vs,gc,st,cl)	Cernoziom argiloiluvial Sol negru clinohidromorf	Phaeozem	24657	3,52
7	Rendzină (li, cb, ka)	Rendzină	Rendzic Leptosol	140	0,02
	C e r n i s o l u r i	Molisoluri		**211474**	**30,19**
8	Eutricombosol (ti,mo,vs,ro,al)	Soluri brune eumezobazice Sol roşu-tera rosa	Eutric Cambisol	88750	12,67
	C a m b i s o l u r i	Cambisoluri		**88750**	**12,67**
9	Preluvosol(ti,mo,rs,vs,ca,st)	Sol brun roşcat Sol brun argiloiluvial	Haplic Luvisol Calcic Luvisol	84899	12,12
10	Luvosol (ti, rs,ab,vs,pe,st)	Sol brun roşcat luvic Sol brun luvic Luvisol albic	Luvisol (pp) Podzol Luvisol (pp)	76352	10,90
11	Planosol (ti,ab,vs,st)	Planosol	Planosol	4203	0,60
	L u v i s o l u r i	Argiluvisoluri		**165454**	**23,62**
12	Vertosol (ti,gc,st,br)	Vertisol	Vertisol	71028	10,14
	P e l i s o l u r i	Vertisoluri		**71028**	**10,14**
13	Gleisol (eu,di,ka,mo,ce,ca,pe,al)	Lăcovişti Sol gleic	Gleysol	43009	6,14
14	Stagnosol (ti,lv,ab,vs,pl)	Sol pseudogleic	Stagnic Luvisol	7355	1,05
	H i d r i s o l u r i	Soluri hidromorfe		**50364**	**7,19**
15	Soloneţ (ti,mo,lv,ab,sc,gc)	Soloneţ	Solonetz	42379	6,05
	S a l s o d i s o l u r i	Soluri halomorfe		**42379**	**6,05**
16	Antrosol (ar, er)	Erodisol Sol desfundat	(faze puternic erodate)	5604	0,80
17	Tehnosol (ur, li)	Protosol antropic	Anthrosol	3922	0,56
	A n t r i s o l u r i	Soluri trunchiate, antropice		**9526**	**1,36**
	Total Agriculture			**700477**	**100,00**

Of total agricultural acreage in surveyed area, we find 30.19 % Kernozems, 23.62 % Luvisoils, 8.78 % Protisoils, 10.14 % Pelisoils, 12.67 % Cambisoils, 6.05 % Salsodisoils etc.

The factors that have competed in the soil are multiples, share their influence varies from one place to another, depending on the parent rock, relief: position and groundwater mineralization, climate and microclimate, as anthropogenic influences, etc. From here the

spatial distribution and drift of soils with different litologii: horizontal, vertical, zones , microzones.

The 18 soil types characterised and defined accordingly to MESP (Agrochemical and Pedological Study Methodology ") (ICPA Bucuresti , 1987) and identified within main fisical and geographical units of Timis County , constituted basic elements in zones , microzones defining and the main areas agroeconomic. In research area zone defining main criteria was homogeneous ecologic territory (established on land evaluation).

The following have been demarcated such zones :

- *Zone I* , of very favourable is associated Chernozems (typical, gleyc). Is the most fertile area of space explored: Jimbolia-Biled-Lovrin-Tomnatic-Cenei-Ionel-Ciacova-Deta. The main cultures practiced are: wheat, corn, sunflower, sugar beet, vegetables, etc.
- *Zone II*, favourable is associated Chernozems (cambic), Chromic Luvisols, Haplic Luvisols, in the states general meet in neighborhood (or in combination) Chernozems in the low plain. These soils exhibit physical and chemical properties for vegetable-growing, after chernozemsthe most fertile soils.
- *Zone III*, middle is associated Vertic Luvisols, Luvisols, Vertisol etc. The soil fertility of this area is subject to the regime of rainfall. These soils are often in the Piedmont Plains Vingăi, Gătaiei, Sacoşului, etc. as well as their contact with Hills.
- *Zone IV*, least favorable is associated Albeluvisols, Planosols, encountered frequently in contact areas of the Piedmont Plains, energetically rolling plane, and entering depressions and mountain, and in areas Hills (H. Surducului, H. Lipovei, H. Pogănişului etc.). Great acidity, aerohidric, poverty in the nutrients available to plants, require complex arrangements for improvement such as: calcium periodic amendments, drainage area (modeling, smoothing, ditches and channels, drainage,) picks and fertilization ameliorativă (organo-mineral), asolamente with ameliorative plant (legume mixtures and perennial grasses).
- *Zone V*, unfavorable, is associated with deficient soils, as well as: Stagnic Luvisols, Dystric Cambisols, met frequently with the connection of the Piedmont Plains, and Piedmont (case of soils with excessive water stagnation) and in high-mountain areas with a cold and humid climate, the acidic rocks looking general coarse gravels, sands, (derived from shale deposits of crystalline and igneous). Chemical and physical properties make these deficient soils are some of the worst agricultural crops. In fact the order in the mountainous area with rugged terrain, agricultural use is not possible, they can be used (in the case of deforestation forests of spruce) as alpine pasture.

Areas of agroeconomic groups administrative and cadastral territories farms based on element similar on the sensitive: the conditions of relief, climate, soils, introduction of irrigation technique and equipment (inland communications, food, etc.), traditional agricultural activity, and also the profile of the territories considered in so far as it meets the criteria on the achievement of a sustainable development perspective.

Zone 1, the area of cultivation of grain, technical crops and intensive livestock rearing, including of the area of 78,86 researched (48,3% meadow and low plains and 30,56 % having said in high plains), that in terms pedologic of area chernozems (typical, gleyc, cambic, etc.), whose spread is associated with relatively recent deposits rich in carbonates such as: loess, loessoide, etc., along with the relatively young. Is the most fertile area of space explored: Jimbolia-Biled-Lovrin-Tomnatic-Cenei-Ionel-Ciacova-Deta, etc., where the predominate crops such as wheat, barley, maize, sunflower, sugar beet, annual and perennial crops. As animal species we can mention: cattle, pigs, poultry, etc. Within this area in porţionile where chernozems intermingle with the fluvisols and eutric cambisols area of cereal

and it overlaps with the gourd. The productive potential of the area native is affected in some years (becoming more and more frequent in recent decades) of stress actually obligate to impose the practice of irrigation.

Zone II, the culture of the vine and of extensive growth, corresponding to the area of contact between the plain and the hills, piemontana area through the wine-growing tradition that has favorable conditions for the development of this sector. The area is famous vineyards such as those enshrined in Recas, etc., in addition to vineyards in the area are cultivated cereals, legumes, potatoes, fodder plants and technical. Also is raising cattle for milk and breeding sheep.It should be noted that the demarcation of this area, contrary to the fact that other regions were attempted to be respected in this part of the administrative zone delineation was made according to geomorphological forms and limit as much as possible of the topoclimatelor specific vineyards.

Zone III, the fruit and animal husbandry, corresponding to units of the Piedmont Hills area (H. Lipovei, H. Fraguli, H. Poganis, H. Surduc, etc.).

Climate corresponds to the bottom with annual average temperatures below 10^{o} C and precipitations between 700-800 mm and characteristic soils are haplic luvisols (typical, vertic, stagnic) and luvisols (stagnic, vertic, etc..), being present and large parts of the piedmont Lipovei chromic luvisols. The area is favourable for horticulture, viticulture and livestock, cultivating grain, vegetables and potatoes.

Zone IV, pastorate area, located in the eastern part of the district, represented for the most part by Poiana Rusca mountains, is characterized by an agro-forestry profile, being favorable to livestock. So between the valleys of the mountains and descending mountains or peaks of the streach the river to the east County, meet a number of favourable grazing areas.

The average annual temperature is 8-9^{o} C and falling rainfall annually are over 8% in area and dystric cambisols, covered in mostly beech forests from 600 m and oak up to this altitude.

CONCLUSIONS

Although the geographic area studied is not too different bioclimatic conditions, however, due to the variation of hydrological processes of litologice and solificare differ from one place to another, causing an increased variability of edaphic factors, telurico-, which contributes to the achievement of the environment in which plants grow and harvest.

Generally, the land using distribution is according to pedoclimatic conditions, but this is not always most suitable for long-term land sources administration.

Structural , social , and economic diversity of surveyed area , is strongly determined by relief form distribution , with decisive impact on terrain quality . We remark the weight of arrable terrain (75,89 % of total agricultural acreaga). Of this area, 55,30 % meadow and low plains, 34,70% high plains and terraces, 8,7% in hills and 1,30 % in mountains

The awareness on natural conditions, on ecological potential of the terrain for main crops presents a particular importance in soil qualification zones works. This is the start point to establish crop structure and to estimate yield.

Specific pedoclimatic conditions of researched space allow the development of some sectors (vegetable, fruit, fish).

Considering that the main parameter in the estimation of future value of ecopedologică productions presented in the form of bonitates, it can be used for zones,

agroeconomic, microzones and contouring so that every locality to strengthen their presence in both traditional markets and other markets of the world through quality products.

The obtained production results can fundament in the future the choissing of some adequate technologies for the climatic and soils conditions of the area where the research was made and also for other similar areas.

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