USING PEDOLOGIC INFORMATION IN ESTABLISHING FAVOURABILITY OF MAIN CROPS IN THE GIARMATA AREA

Anişoara DUMA – COPCEA, Cristina STANCIU, Casiana MIHUŢ, L. NIŢĂ,

University of Agricultural Sciences and Veterinary Medicine of Banat "King Michael I of Romania" in Timisoara, Faculty of Agriculture, 300645, Aradului no. 119, Romania,

E-mail: duma _anisoara@yahoo.com

Abstract. *The paper's purpose is to present eco-pedological resources and the qualitative evaluation in order to facilitate the sustainable development of the presented land (land occupying the highest percentage). The research is oriented on the soils, the accent being on the qualitative evaluation so as to facilitate the sustainable development. The proposed objectives for the elaboration of this paper, were the following: -the characterization of the studied area form the point of view of the natural condition; the study of the environmental factor influence on soil formation and evolution; the study and determination of soil physical and chemical characteristics; as a result of these studies and research, the evaluation of the soil's productive capacity for a more correct and sustainable usage; the pedological research and studies diversification and specialization. As research materials we used: - land belonging to an administrative-territorial unit for the 6119 ha surface. The calculation of average productions per ha for each bonited plant is done based on a bonitary grade awarded as reported to the technologic level which can be insure at one point, and which establishes the productive capacity of each bonitary point.*

Keywords: *soil , evaluation, physical and chemical characteristics*

INTRODUCTION

Situated in the central-northern area of the Timis county (45°83' northern latitude and 21°32' eastern longitude), on DJ 691, the Giarmata locality, the residence of the commune with the same name, is situated at a 11 km distance of the city of Timişoara and, through DC 58, at 1.3 km of the Timişoara International Airport. The Giarmata commune covers a surface of 7150 ha, of which 6292 ha represent tillable land, and 43.5 ha forest. This administrative area encompasses the Giarmata **and** Cerneteaz localities. The former's historical existence is attested by papal documents from 1332. Situated in the western part of the country, the researched territory is characterized by a moderate continental climate, with short and mild winters, frequently under the influence of cyclone activity and air masses from the Mediterranean and Adriatic Sea. The climatic province sector with under-Mediterranean influences presents as a main characteristic, in winter, warm south-west air advections, generated by Mediterranean cyclones, which determine a milder climate, with more frequent precipitations such as rain and slush, low intensity winter climatic phenomena, low duration of the snow layer (15-20 days), one of the longest iceless intervals in the country, episodic freezing, and an almost continual vegetation period. Within the annual precipitation regime, a main maximum is registered in May-June and a secondary one in December. The characteristic vegetation is the one specific to the semi-humid sylvan-steppe.

MATERIAL AND METHOD

As research materials we used: - land belonging to an administrative-territorial unit for the 6119 ha surface. In order to characterize the climate conditions, climatic data registered and interpreted at the Agrometeorology discipline, from the Faculty of Agriculture were used. As a very complex natural system, the soil study requires an increased method and procedure diversity, some general, others adaptated to soil from related sciences, and others specific to the field. All study procedures have a common starting point, namely the elementary territorial soil entity, which is investigated by pedological researchers. The "*in extenso*" usage of pedological information accumulated in various libraries, and especially in the archives of the Agrochemical and Pedological Offices in Timisoara, was partially restricted by numerous changes of the soil study elaboration methodology, carried out over time. A reactualization of old information was necessary, as well as a homogenization of the entire data base, in accordance with the new principles introduced in Romania in the field of soil taxonomy, classification characterization, simultaneously with the finalization and implementation, in 2003 and then in, of the Romanian Soil Taxonomy System. The calculation of average productions per ha for each bonited plant is done based on a bonitary grade awarded as reported to the technologic level which can be insure at one point, and which establishes the productive capacity of each bonitary point. In the present paper, 10 situations were operated comprising usages and various agricultural and pomiculture plants, such as:

- wheat;
- corn;
- sunflower;
- sugar beet;
- potato;
- plum tree;
- apple tree;
- cherry tree;
- sour cherry tree;
- apricot tree.

RESULTS AND DISCUSSIONS

Boniting agricultural land is a complex operation of deepening plant growth, development and fruitification conditions and of determining it favourability (pretability) for certain crops (or usage categories), through a system of technical indices and bonitary grades. The commune agricultural land is constituted by the following usages:

- tillable 4859 ha (77.2%),
- grazing land 834 ha (13.3%),
- hay land 121 ha (1.9%)
- orchards 305 ha (4.8%).

Regarding the division of the studied surface into quality (fertility) class categories, for the "tillable" usage category, the situation is as follows:

- 1st cl. 128 ha (2.6%),
- 2nd cl. 913 ha (18.8%),
- 3rd cl. 2852 ha (58.7%),
- 4th cl. 850 ha (17.5%)
- 5th cl. 116 ha (2.4%).

Table 1

Soil favourability for wheat, grain corn and sunflower crops

Crt. No.	Soil type	Wheat		Corn		Sunflower	
		Bonit. grade	Fertil. class	Bonit. grade	Fertil. class	Bonit. grade	Fertil. class
1.	Colluvic alluvosoil	41	VI	52	V	47	VI
2.	Typical preluvosoil	73	III	65	IV	65	IV
3.	Stagnogley eutricambic soil	58	V	45	VI	43	VI
4.	Stagnic vertosoil	33	VII	22	VIII	23	VIII
5.	Proxi-gley gley soil	20	IX	28	VIII	25	VIII

Table 2

Soil favourability for sugar beet and potato crops

Crt. No	Soil type	Sugar beet		Potato	
		Bonit. grade	Fertil. class	Bonit. grade	Fertil. class
1.	Colluvic alluvosoil	51	V	41	VI

2.	Typical preluvosoil	58	V	52	V
3.	Stagnogley eutricambic soil	32	VII	28	VIII
4.	Stagnic vertosoil	19	IX	11	IX
5.	Proxi-gley gley soil	51	V	41	VI

Table 3

Soil favourability for plum and apple crops

Crt. No.	Soil type	Plum		Apple	
		Bonit. grade	Fertil. class	Bonit. grade	Fertil. class
1.	Colluvic alluvosoil	65	IV	58	V
2.	Typical preluvosoil	64	IV	45	VI
3.	Stagnogley eutricambic soil	52	V	59	V
4.	Stagnic vertosoil	20	IX	15	IX
5.	Proxy-gley gley soil	21	VIII	13	IX

Table 4

Soil favourability for cherry, sour cherry and apricot crops

Crt. No.	Soil type	Cherry		Sour cherry		Apricot	
		Bonit. grade	Fertil. class	Bonit. grade	Fertil. class	Bonit. grade	Fertil. class
1.	Colluvic alluvosoil	45	VI	45	VI	50	VI
2.	Typical preluvosoil	64	IV	64	IV	64	IV
3.	Stagnogley eutricambic soil	47	VI	47	VI	41	VI
4.	Stagnic vertosoil	15	IX	15	IX	11	IX
5.	Proxi-gley gley soil	11	IX	11	IX	10	X

The crops elected for the favourability calculation are those with a higher percentage. The soils, bonitary grades and fertility classes marked with green present a better favourability than those marked with red.

1. Soil favourability for wheat, corn and sunflower crops.

The typical preluvosoil for the wheat crop presents a 73 value, 3rd fertility class, while the corn and sunflower crops present a 65 value, 4th fertility class, as compared to the **stagnic vertosoil** which presents a 33 value, 7th fertility class respectively, for the wheat crop and 8th class values for the grain corn and sunflower crops..

Low values are due to the following restrictions:

Typical preluvosoil presents**:**

- *Reduced restrictions* due to the humus fund;
- *Moderate restrictions* due to acidity;
- *Severe restrictions* due to soil compactness.

Stagnic vertosoil presents:

- *Reduced restrictions* due to alkalization;

- *Reduced restrictions* due to the $CaCO_3$ content;

- *Reduced restrictions* due to physical soil properties – texture;

- *Sever limitations* regarding soil compactness;

2.Soil favourability for the sugar beet and potato crops.

Typical preluvosoil presents values of the 9th class.

These values are due to the following restrictions:

- *Moderate restrictions* due to soil acidity.
- *Reduced restrictions* due to the humus fund;

Humus is mostly made up of an organic compound complex with a complex molecular structure.

- *Sever limitations* due to soil compactness.

Stagnic vertosoil for the beet and potato crops presents 9th class values.

These values are due to the following restrictions:

- *Moderate restrictions* due to the humus fund;
- *Reduced restrictions* due to the $CaCO_3$ content;
- *Reduced restrictions* due to physical soil properties – texture;
- *Reduced restrictions* due to alkalization;
- *restrictions severe* due to compactness.

3.Soil favourability for fruit tree crops (plum, apple, cherry, sour cherry and apricot).

For the **plum and apple trees** the colluvic alluvosoil presents: a 65 value pertaining to the 4th class for the plum and a 58 value, respectively the 5th class, for the apple crop.

This soil presents the following restrictions:

- *Reduced restrictions* due to soil salinity;
- *Reduced restrictions* due to the humus fund;
- *Severe restrictions* due to soil compactness.

Proxi-gley gley soil presents a 21 value, 8th fertility class, for the **plum** and a 13 value, respectively 9th fertility class, for the **apple** crop**.**

These values are penalized due to the following restrictions:

- *Moderate restrictions* due to the humus fund;
- *Reduced restrictions* due to $CaCO_3$ content;

- *Reduced restrictions* due to physical soil properties – texture;
- *Severe restrictions severe* due to soil compactness.

For the **cherry, sour cherry and apricot** crops, for the typical preluvosoil, the bonitary grade value is of 64, respectively 4th fertility class.

This soil presents the following restrictions:

- *Moderate restrictions* due to soil acidity;
- *Reduced restrictions* due to the humus fund;
- *Severe restrictions* due to soil compactness.

In order to reduce the soil's reaction to optimal limits, a periodical calcium amendment will be undertaken. The amendment dosage will be established according to the agrochemical mapping recommendations. Among the fundamental soil characteristics which present a more determinable function, the $CaCO_3$ content influences the plant growth and fruitification in direct relation with the phenomena manifesting way and intensity. Texture plays an important role in insuring the necessary conditions for plant growth and fruitification (it carries out a differentiated rooting in relation with the texture), broadening or limiting its production capacity, just like other characteristics. Since texture is one of the characteristics hard to change over time, the optimal moment for carrying out founding and maintenance works will be chosen. Soil compactness is linked to the granulo-metric make-up, reaching maximal values with clayey soils lacking structure, influenced by the water, humus content and cat ion nature. In case of need, deep or under-solaj aeration and long term crop rotation introduction as well as ameliorative crop introduction, the establishment of an adequate pasture animal load.

CONCLUSIONS

Situated in the north-central area of the Timiș count (45°83' north latitude and 21°32' east longitude), the Giarmata locality, residence of the commune bearing the same name, lies at an 11 km distance from the city of Timisoara and 1.3 km from the Timisoara International airport. The Giarmata commune covers a 7150 ha surface, of which 6119 ha represent agricultural land, and 43.5 ha forest. This administrative area encompasses the **Giarmata** and **Cerneteaz** localities. The former's historical existence is attested by papal documents from 1332. As a part of the Timiș county, Giarmata beneficiates from the same moderate continental climate. Its general traits are marked by the atmospheric process diversity and irregularity, even in winter, humid warm air masses come from the Atlantic, bringing significant rains and snows, more rare cold waves. From September to February, frequent continental polar air penetrations are manifested, coming from the East. However, in Banat, one can strongly feel the cyclone influence, as well as the one from the warm air masses coming from the Adriatic and Mediterranean Sea, which in winter leads to a complete thaw and in summer to smothering warmth periods. Regarding the commune agricultural land, this is constituted by the following usages: tillable 4859 ha (77.2%), grazing 834 ha (13.3%), hay land 121 ha (1.9%) and orchards 305 ha (4.8%). Regarding the quality (fertility) class of the studied surface, for the "tillable" land surface, the situation is as follows: 1st cl. 128 ha (2.6%), 2nd cl. 913 ha (18.8%), 3rd cl. 2852 ha (58.7%), 4th cl. 850 ha (17.5%) and 5th cl. 116 ha (2.4%).

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