THE FAVORABILITY FOR THE MAIN AGRICULTURALS CULTURES IN THE SÂRCA FRUIT-GROWING BASIN

FAVORABILITATEA SOLURILOR PENTRU PRINCIPALELE CULTURI AGRICOLE DIN BAZINUL POMICOL SÂRCA

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Abstract. *Acquiring thorough knowledge the conditions of plant growth and establishing the degree of favorability of these conditions for each use and culture is part of the complex work of land evaluation. With regard to this, in the first part of the paper we intend to present some aspects regarding the relief, the climate, the hydrology and the soil cover in the Sârca fruit-growing basin (The hilly plain of Jijia). In order to achieve an overall vision of soil favorability for different crops and uses (a reduced number of crops and uses were taken into account: wheat, corn, sunflower, apple tree, cherry tree, meadows, pastures) in the studied area, these were grouped in 5 favorability classes. The situations for each class were presented. Also, correlations were made between the favorability classes of soils and the current productivity classes of crops taken into account.*

Key words: favorability classes, soil resources, evaluation notes, crops, fruit-growing basin

Rezumat. *Operaţia de cunoaştere aprofundată a condiţiilor de creştere a plantelor şi de determinare a gradului de favorabilitate a acestor condiţii pentru fiecare folosinţă şi cultură face parte din lucrarea complexă de bonitare a terenurilor. În acest sens, în prima parte a lucrării ne-am propus să prezentăm câteva aspecte cu privire la relieful, clima, hidrologia şi învelişul pedologic din bazinul pomicol Sârca (Câmpia colinară a Jijiei). În ideea realizării unei viziuni de ansamblu asupra favorabilităţii solurilor pentru diferite culturi şi utilizări (s-a luat în calcul un număr redus de culturi agricole şi utilizări: grâu, porumb, floarea soarelui, măr, cireş,vişin, fânețe, păşuni) din arealul studiat, s-a realizat o grupare a acestora în 5 clase de favorabilitate. S-au prezentat situaţiile pentru fiecare clasă. De asemenea, s-au făcut corelaţii între clasele de favorabilitate a solurilor şi clasele de productivitate actuală a culturilor luate în calcul.*

Cuvite cheie: clase de favorabilitate, resurse de sol, note de bonitare, culturi agricole, bazin pomicol

INTRODUCTION

Favorability is the measure which indicates how soils satisfy the crop growth and development requirements for various plants and agricultural species within a normal climate setting and average farm practices. From this point of view, soils are divided in favorability classes, ranging from most suitable to those improper for agricultural growth.

The purpose of the Sârca fruit-growing basin terrain (soil) evaluation, from the point of view of favorability, is to establish optimum usage practices, considering both environmental and socio-economic factors.

In order to obtain a reliable result pertaining to soil favorability, a holistic approach of the soil system is required. When establishing the soil favorability for various crops, good knowledge of both the soil multiple functions and the interaction between agricultural activities and soil quality are needed.

MATERIALS AND METHODS

The soil favorability analysis for different crops within the Sârca fruit-growing basin represents the result of reading and interpreting data acquired through complex pedologic studies performed by OJSPA - Iaşi (1995, 1999), on a 1:10000 scale. Soil favorability in the Sârca fruit-growing basin has been studied for the following crops and agricultural usages: wheat, corn, sunflower, apple, cherry, meadows and pastures. Soil classification is done according to the Romanian System of Soil Taxonomy (SRTS) – 2003. Soil classification into favorability classes and the evaluation points calculation (OJSPA data has also been used) have been performed according to "Pedologic studies elaboration methodology", vol II, III, I.C.P.A, Bucharest, 1987.

RESULTS AND DISCUSSIONS

The Sârca fruit-growing basin which overlaps the Bahluieț hydrographic basin, the most significant affluent of the Bahlui river, is situated in the southernmost part of the hilly plain of Jijia, at the boundary with the Iassy Coast. Within this study, the physical-geographic boundaries of the Sârca fruit-growing basin have been set to Valea Oilor to the north and east, the Bahluieț Valley to the south and the Bălțați Valley to the west.

From an administrative point of view, the basin is situated in the south-east of Bălțați commune (east of Bălțați village where the administrative center of the commune lies), 12 km from Târgu-Frumos town and 36 km from Iaşi city (municipality). Considering the established physical-geographic boundaries, a surface of 1210,6 ha has been calculated for the Sârca fruit-growing basin.

The relief morphology, deeply tied to the monoclinal structure of the geological deposits (bassarabian and quaternary) modeled by the water streams, is outlined by the north-west oriented coast alternation and cuesta backs, and the wide interfluves with a general south-eastern inclination. The right sides of the Bahluieț and Oilor valleys are affected by intense slope processes, predominantly landslides. Within the plateaus and interfluves crests, the relief mean declivity averages at 3 – 5°C, while on low energy sides, the slopes do not exceed 10°C. On the cuestaform sides, the values for side slopes go beyond 20°.

From a geological perspective, the studied areal is situated in the Bassarabian (ashen blue clay marls' layers) and Quaternary (loessoid deposits, eluvial clays, fluviatile deposits) prevalence area.

From a climate perspective, the Sârca fruit-growing basin belongs to the temperate-continental climate. The annual average temperature value is 9,2°C

(Podu-Iloaiei) and the multi-annual precipitation average is 550,8 mm in Podu-Iloaiei and 502,3 mm in Târgu-Frumos. The hydrographic network consists of low-level water streams which regularly run dry during summer. The main water stream is the Bahluieț river, along with its left affluent stream, Valea Oilor.

From a geobotanic point of view, the Sârca fruit-growing basin is of forest steppe type. However, the natural vegetation has been mostly replaced with crop by human intervention. The available agricultural area in the Sârca fruit-growing basin is divided between orchards (most occupied area at 50,03%), followed by tillable land (26,36%), pastures and meadows (19,23%), vineyards (3,43%), forests (0,94%) (fig. 1).

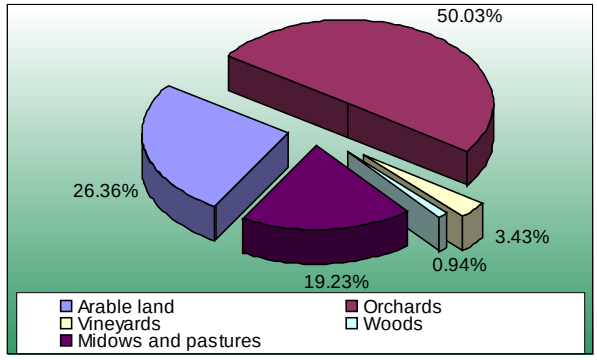

Fig. 1. Terrains distribution according to usage categories

Part of the natural setting, the soil has formed under the influence and concurrence of specific (soil genesis) factors, such as: climate, rocks, relief, ground and stagnant water, anthropic factors and the passage of time.

According to Romanian System of Soil Taxonomy (SRTS – 2003), within the Sârca fruit-growing basin four soil classes have been identified: cernisols, anthrisols, protisols and hydrisols.

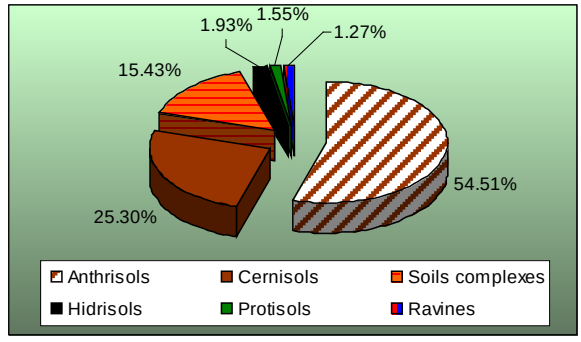

Fig. 2. Soil classes distribution in the Sârca fruit-growing basin

As can be observed in figure 2, the pedologic layer of the studied areal is dominated by the anthrisols class (54,51%), which occupies the central part of the

Sârca fruit-growing basin, the cuesta reverse side respectively. The cernisols class accounts for 25,30% of the pedologic layer, this type of soils showing up on flat or mildly sloped surfaces (plateaus, terraces, mildly sloped sides). The protisols class (1,55%) is particular to steeply-sloped sides and water stream meadows (Bahluieț and Valea Oilor fields). Hydrisols class soils (1,93%), formed during excessive humidity conditions, can be spotted on limited areas south of the fruit-growing basin, close to the Bahluieț flow. Soils complexes (15,43%) have a discontinuous spatial distribution, showing up on slope sides with clay – marl deposits within the studied area and represent soil mergers mostly of different types.

For the Sârca fruit-growing basin, according to soil favorability, a scale of 5 soil classes has been used to determine agriculatural usefulness (table 1).

Table 1

The framing soil units from Sârca fruit-growing basin in the favorability classes

Soil Classes and Types	**The favorability classes for the main agricultural cultures**						
Cernisols Class	***WH***	***CN***	***SF***	***AT***	***CT***	***MD***	***PS***
Typical chernozem	II	II	II	II	II	III	III
Typical chernozem with surface mild erosion	II	III	II	II	II	III	III
Typical chernozem with surface moderated erosion	II	III	II	III	II	III	III
Typical cambic chernozem	II	II	II	II	II	III	III
Cumulic typical cambic chernozem	II	II	II	II	II	III	III
Typical cambic chernozem with mild surface erosion	II	III	II	II	II	III	III
Anthrisols Class	***WH***	***CN***	***SF***	***AT***	***CT***	***MD***	***PS***
Hortic anthrosol	III	III	III	III	II	III	III
Cambic hortic anthrosol	II	III	II	II	II	III	III
Gleied hortic anthrosol	IV	IV	III	V	V	II	III
Typical erodosoil	III	IV	IV	IV	III	IV	III
Protisols Class	***WH***	***CN***	***SF***	***AT***	***CT***	***MD***	***PS***
Moderately alkalized, mildly salinized, strongly gleied fluvisol	V	V	IV	V	V	III	III
Colmatated through water, moderately alkalized, mildly salinized, mollic colluviosoil	III	IV	II	V	V	III	III
Hydrisols Class	***WH***	***CN***	***SF***	***AT***	***CT***	***MD***	***PS***
Salinized gleyosoil	V	V	V	V	V	V	V
Mildly alkalized, moderately salinized gleyosoil	V	V	IV	V	V	III	III

Class I favorability, representing highly reliable soils, with no restrictions and good harvest output, has not been identified in the Sârca fruit-growing basin.

Class II favorability represents average soils, with low limitations on agricultural production and little improvement actions required. This class includes the chernozem type soils, favorable for most of the considered crops (wheat, sunflower, apple, cherry tree), the hortic anthrosol propitious to cherry

plantations, the cambic hortic anthrosol which proves favorable to wheat, sunflower, apple and cherry plantations.

Class III favorability is characterized by medium favorability soils, reducing the agricultural crop array and requiring some improvement actions. This class contains soils of the cernisols class, with a medium favorability for pastures and meadows. Also part of this class are the hortic anthrosol (wheat, corn, sunflower, meadows, pastures), the gleied hortic anthrosol (sunflower, pastures), the typical erodosoil (wheat, cherry, pastures), the strongly gleied fluvisol (meadows, pastures) and the mollic colluviosoil (wheat, meadows, pastures).

Class IV favorability refers to feeble soils, with severe limitations on crop harvest, requiring intensive improvement actions for a stable harvest. This class includes the following types: the gleied hortic anthrosol with low favorability for wheat and corn; the typical erodosoil with weak productivity for corn, sunflower, apple and meadows; the strongly gleied fluvisol (sunflower)

Class V favorability contains soils improper for agricultural or fruit-growing activity, even by improvement action; still, these can be used for meadows, pastures, forests. This category holds gleied hortic anthrosol, unfavorable to apple and cherry, strongly gleied fluvisol and mildly alkalized, moderately salinized gleyosoil , unprosperous for wheat, corn, apple and cherry, and the mollic colluviosoil, improper for apple and cherry. Also part of Class V favorability is the salinized gleyosoil, unsuited for all crops.

Following is the favorability per each type of soil in the Sârca fruit-growing basin for each considered crop.

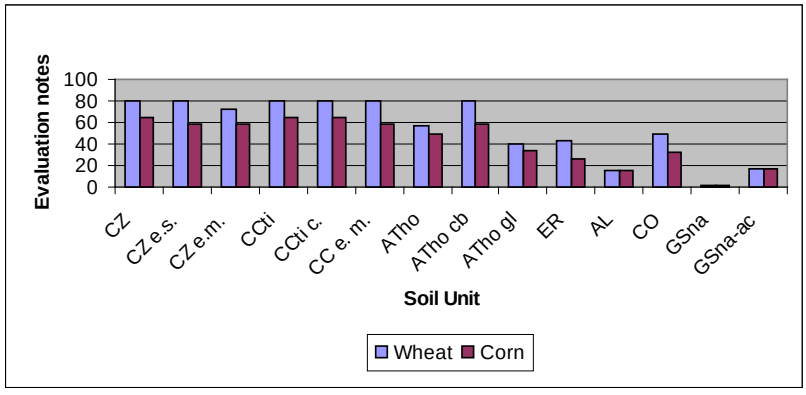

Fig. 3. Wheat and corn favorability for main soil types in the Sârca fruit-growing basin

In figure 3, it be observed that the favorable soils for wheat growth are the chernozem type soils and the cambic hortic anthrosol, with 80 evaluation points. These soils present class II favorability for this crop.

For corn, the class II favorability soils are the typical chernozem, the typical cambic chernozem, the cumulic typical cambic chernozem, each with 65 evaluation points. Soils that ensure medium favorability for wheat crops (class III

favorability) are the hortic anthrosol with 57 evaluation points, the typical erodosoil with 43 evaluation points and the salinized mollic colluviosoil with 50 evaluation points, while for corn, the medium favorability soils are the typical chernozem with mild surface erosion, the typical chernozem with moderated surface erosion, the gleied hortic anthrosol with 58 evaluation points and the hortic anthrosol with 50 evaluation points.

Class IV favorability for wheat and corn crops contains the gleied hortic anthrosol (40 evaluation points for wheat and 34 evaluation points for corn), which provides a weak development environment for these crops. Also part of class IV favorability for corn is the typical erodosoil (26 evaluation points) and the mildly salinized mollic colluviosoil with 32 evaluation points.

Improper soils for both wheat and corn crops from favorability class V are the strongly gleied fluvisol (16 and 15 evaluation points, respectively), the salinized gleyosoil (1 evaluation point for both crops) and the mildly alkalized, moderately salinized gleyosoil (17 evaluation points for wheat and corn).

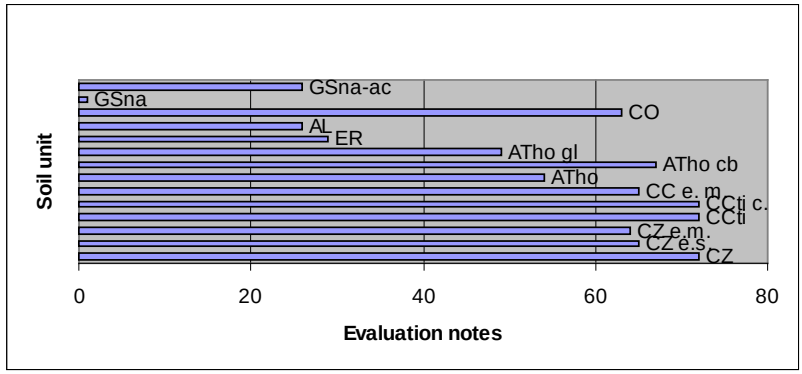

Fig. 4. Sunflower crop favorability for the main soil types in the Sârca fruit-growing basin

Soils with good favorability for sunflower crops (fig.4) from the favorability class II are the cernisols class (the typical chernozem – 72 evaluation points, the typical chernozem with mild surface erosion – 65 evaluation points, the typical chernozem with moderated surface erosion – 64 evaluation points, the typical cambic chernozem - 72 evaluation points, the cumulic typical cambic chernozem – 72 evaluation points, the typical cambic chernozem with mild surface erosion - 65 evaluation points) and also the cambic hortic anthrosol with 67 evaluation points and the mildly salinized mollic colluviosoil with 63 evaluation points. The favorbility class III for this crop, represented by the hortic anthrosol and the gleied hortic anthrosol, with 54 and 49 evaluation points respectively, results in low harvest output. The typical erodosoil and mildly salinized gleyosoil, each with 29 evaluation points, along with the strongly gleied fluvisol (26 evaluation points), are part of class IV favorability and of low quality to sunflower. Class V favorbility for sunflower crop is represented by the salinized gleyosoil with 1 evaluation point.

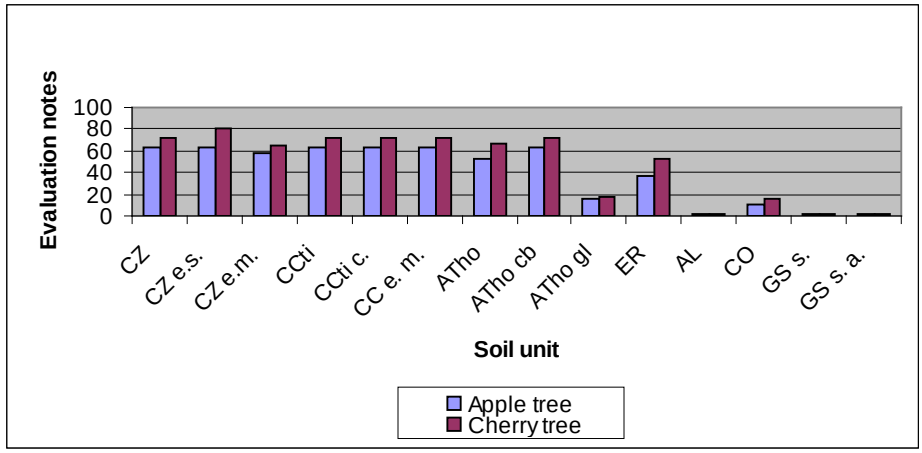

Fig. 5. Soil favorability for apple and cherry plantations in the Sârca fruit-growing basin

With the exception of the typical chernozem with moderated surface erosion, part of class III favorability (58 evaluation points), the other types soils of cernisols class are favorable for apple plantations (64 evaluation points) and are included in class II favorability (fig. 5). For the cherry plantations, all soil types in the cernisols class are highly favorable, with evaluation values ranging from 65 points (the typical chernozem with moderated surface erosion) to 80 points (the typical chernozem with mild surface erosion). Also included in the class II favorability for apple and cherry plantations is the cambic hortic anthrosol. The hortic anthrosol lies within the quality class III for apple crop (52 evaluation points) and favorability class II for cherry (67 evaluation points). The typical erodosoil is established as class III favorability for cherry plantations (52 evaluation points) and class IV for apple (37 evaluation points). Soils from class V favorability for apple and cherry are: the strongly gleied fluvisol, the mildly salinized mollic colluviosoil, the salinized gleyosoil and the mildly alkalized, moderately salinized gleyosoil.

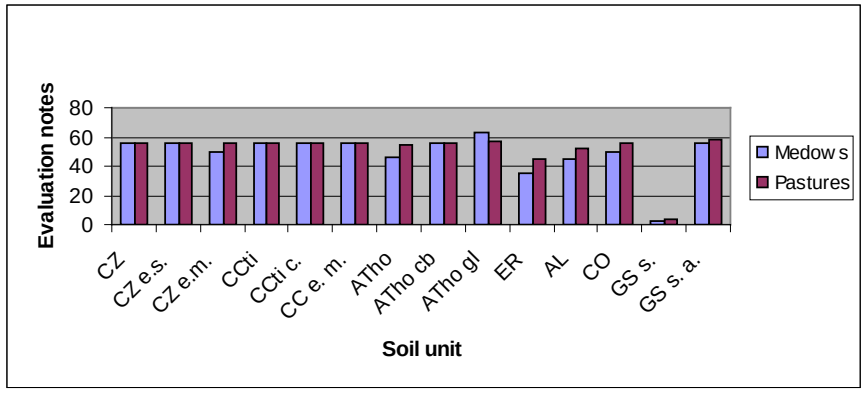

Fig. 6. Soil favorability for pastures and meadows in the Sârca fruit-growing basin

As can be observed in figure 6, for pastures and meadows, most types of soils are class III favorability. Exceptions are the gleied hortic anthrosol with 63 points, part of class II for meadows, the typical erodosoil from class IV favorability for meadows and the salinized gleyosoil, unfavorable for both pastures (3 evaluation points) and meadows (4 evaluation points)

CONCLUSIONS

From the favorability point of view, the predominant soil types in the Sârca fruit-growing basin are those in favorability classes II and III.

All soil types in the cernisols class are part of favorability classes II and III.

Soils of the hydrisols class are included in class V favorability for almost all crops, with the exception of the mildly alkalized, moderately salinized gleyosoil, part of class III favorability for pastures and meadows.

Comparing the two considered cereal crops, wheat and corn, it can be noticed that corn is more "sensitive" to soil types.

For tree-growth plantations (apple and cherry), soils are approximately within the same favorability classes for both species.

Most of the soils from the studied areal are have high or medium favorability for a large array of crops.

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