LIMITING FACTORS OF AGRICULTURAL PRODUCTION WITHIN TERRITORY OF NICOLAE TITULESCU, OLT COUNTY

Lica TUTI, D. ȚĂRĂU

Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Agricultural Sciences, Timisoara, Aradului Street, no. 119, RO-300645, Romania
E-mail: licatuti@ymail.com

Abstract: *Under natural condition relatively different micro aspect, characteristic of various forms of relief and microrelief on the territory of Nicolae Titulescu, formed and evolved over time that soils differ in terms of both morphologically and in terms of their productive capacity, that fertility. Soil fertility is expressed through their sustainability to increase productivity in relation to ecological requirements and environmental protection. The purpose of this paper aims to inventory the limiting factors (restrictive) of land use for agricultural production and to establish measures to reduce or cancel agropedoameliorative adverse influence the productivity of soils. Objectives and activities which it proposing this theme fall within the current preoccupations of research and agricultural practices in of international and national level for the study, highlighting the nature and intensity of the limiting factors of agricultural production and improvement requirements and grouping land suitability classes in relation to running the study and preparation are part of the doctoral school in Timisoara USAMVB to achieve doctoral thesis on "the foundation ecopedological the cadastral value on agricultural land in the county Olt". Perimeter investigated is located in the central eastern part of the county Olt and eastern Plains Iminogului(part of the Plain Boianu) in contact with the river Vedea valley to see. Distances from major cities are: approx. 60 Km south-east of Slatina (county) and approx. 25 Km north-east of the city Drăgănești-Olt. Land area totals 2015 ha Nicolae Titulescu village land, of wich 1828 ha of arable, 155 ha pasture and 32 ha vineyard. Agricultural science and practice have shown that soil fertility can be continuously increased through measures agrotechnical, agrochemical and land improvement, thus preventing soil exhaustion got in culture theory or the so-called law of decreasing soil fertility. Physical and chemical properties of soil samples were analyzed in the laboratory OSPA Olt under and regulation and their interpretation was performed according to the Methodology Elaboration Soil Studies, Bucharest 1987 (vol. I, II, III). In the studies perimeter, agricultural production is negatively influenced by the restrictions given by some soil properties, land and climate, which show equal intensities, reduces productions different depending on the use of land (arable, pasture, vineyard) so that one and the same land may have restrictions on intensitiesvary his usage. In this research, the factors limiting (restrictive)of agricultural production are represented mainly by climatic conditions, topography and soil. Restrictions refer to conditions which reduce yields and the danger of exploitation of degradation, with the same effect. It is estimated that some restrictions are ameliorated and that the arrangement can be exploited in some land close to optimum conditions and restrictions can not be ameliorated. Grouping land pretability classes was made on the basis of factors limiting agricultural production in relation to existing uses at the time of research (arable, pasture, vineyard). Depending on the nature and intensity of extression of the limiting factors, agricultural land in the territory studied were grouped into three (II, III, IV) categories of suitability for such uses, denoted by roman numerals. In this research, limiting factors (restrictive) of agricultural production are represented by: excess moisture occurs on a ground area of 22 ha (1.10%); excess moisture is manifested in a stagnant area of 55 ha(2,70%); grossly soil texture affects an area of 5 ha (0,25%) and fine texture of a area of 990 ha (49,13%); 5% slope of the ground occurs over an area of 20 ha (1,0%); surface erosion occurs in an area of about. 34 ha (1,70%) ; inundability land by overflow occurs in an area of 23 ha (1,14%); the degree of compaction negatively affects an area of 985 ha (49,0%) ; uniformity manifests land area of 51 ha (2,53%) .Agricultural area of 2015 ha of communal territory Nicolae Titulescu fall in class II of pretability.*

Key words: *limiting factors, agricultural land, soil sustaibility, soil improvement*

INTRODUCTION

As a means of production, partly object and product of human activity, soil formed in a period of thousand years at the crossroads of the four envelopes of our planet, has been since ancient times an item was valued and treasured and classified according to scientific knowledge of mankind.

Soils vary greatly in features and fertility that their ability to contribute to the formation of plant growth and crop yields from one area to another.

Agriculture through the special role and its functions is a major user of natural resources from improper influence on the environment.

Agricultural land use strategies incomplete or incorrect seriously affects both quantitatively and qualitatively not only agricultural production but also the soil resources.

Based on field research and laboratory work to consolidate land into categories of suitability for various uses (arable, pasture, vineyard) according to the methodology of Soil Studies Part Two published by ICPA Bucharest in 1987.

Group is to assemble land and an ordering based on their skills are for different uses, specifying the deficiencies that limit their intensive use for various purposes.

MATERIAL AND METHODS

This paper studies an area of 2015 ha, of which the categories of use: arable = 1828 ha, pasture = 155 ha, vineyard = 32 ha .

Research has had the following objectives: to highlight the nature and intensity of the limiting factors of agricultural production and requirements for improvement and grouping land suitability classes in relation to the purpose for running this research.

To achieve the objectives have been collected field data, collected soil samples that were analyzed in the laboratory OSPA Olt.

Characterization ecopedological conditions specific to the limiting factors investigated for determination of the intensity was carried out according to soil studies Elaboration Methodology (Vol. I, II, III), developed by ICPA Bucharest, 1987, Romanian System Solurilo Taxonomy (SRTS-2003) and Field Guide to describe the soil profile and the specific environmental conditions, Craiova, 2009.

RESULTS AND DISCUSSION

Of physico-geographical common Nicolae Titulescu is located in the central eastern province in the Plain Boianului, geomorphological units of the great subdivision of the Romanian Plain, which is actually interfluve Olt-Vedea.

Titulescu territorial administrative unit is located at eastern limit of Boianu Plain, near Găvanu-Burdea Plain, on the right side of the river Vedea. Both fields are subunits of the Romanian Plain.

From other parts of the Romanian Plain, Plain Boianu is characterized by a higher energy relief, given the valleys that fragment: Valley Vezii, Valley Plapcei, Dorofeiului valley, valley Iminogului Călmăţuiului valley. This fragmentation of the landscape is observed Titulescu within the village, where they meet the forms of relief: high plains, river terrace and floodplain river Vedea.

The area is generally flat plains with micrdepressions where stagnant water causing the precipitation phenomena stagnogleyzation.

Altitude field in this area is contained între130-143m. Plain is traversed by valleys that are oriented from NW to SE, which are quite narrow, the yarn forming their low rates of water during rainy periods.

Slopes of the valleys are generally poor and middle slopes between 3-10% with convex or straight profile that there were weak to moderate erosion.

View contact between the field and meadow Vezii is via a slope between 20-25% slope.

Of particular importance in the process of pedogenesis has represented microdepressions microrelief encountered in the field.

Another form of relief found in the studied territory is meadow Vezii the altitude of 114-119 m, decreasing gradually in a southerly direction.

According to published literature on geological drilling performed in area within the village Nicolae Titulescu geological stratifications meet the following:

• In the plateaus of Plain Boianului meet:

- Cîndeşti strata consist of gravel and sands with intercalations of clay and marl. The depth of 55-60 m below.
- Frăţeşti strata is between 55-60 m and 20-25 m and consist of sands and gravels with intercalations of marl and clay (aquifer) belonging to the lower Pleistocene deposits are placed over the clay-sand-free water.

Parent material of great unevenness Boian Plain: sedimentary layer consisting of fine loess clays predominating montmorilonitic (inflatable) that prints characters vertic soils.

Vedea the meadow are the following stratifications:

- Cîndeşti under strata of depth of 55-60 m, overlapping over gravel and sands (aquifers) covered the dusty clays belonging to the Holocene.

Parent material is composed of sediments of different texture (from sandy to clay) soils that have developed are currently in various stages of decomposition of humus.

As for the eastern basin of the territory studied is part of the basin Vedea.

The flowing waters are permanent, as represented by the river Vedea and creek Dorofei.

Vedea River is natural emissary of surface water collection area Boianu Plain NE.

Vedea the monthly average flow has the highest values in March and lowest in October. Most pronounced differences occur in spring and autumn seasons (from approx. 50% to approx. 5% of annual lags).

Maximum leakage Vedea river are elevated in high-intensity rains when there are floods, frequently in the lower sectors.

Groundwater in Plain Boianului is 30-35m deep, and the thread valleys is 18-20m deep. The river meadow Vedea groundwater is 3.01 to 10.0 m deep, isolated being intercepted and at deep of 2.01 to 3.00 m.

In terms of climate investigated area belongs to temperate zone. Temperature is one that can foster the development of vegetation or to mitigate or exclude certain species due to low values, recorded at certain times of year.

For characterization of climatic elements were used data closest weather stations namely Streharet-Slatina Weather Station. According to these data, the studied area belongs to temperate continental climate with a form of type c. f. a. x. after Köppen - or temperate climate but high thermal amplitudes, due to strong cooling and increased heating in summer.

The average annual temperature is $10\text{-}11^0$ C (annual average) and range from -1.7^0 C (monthly average) in January, the coldest month of the year to 22.1^0 C in July, the warmest months.

Precipitation has a decisive role both in developing a type of vegetation and soil in pursuit of specific processes.

Rainfall is characterized by an average annual of 525 mm, the poorest month is February precipitation (25.6 mm), and the rain is June (99.5 mm).

The largest amount of precipitation falls from May to augast (293.9 mm - more than half the annual average). During this period most of the precipitation falls as heavy rain (about half the rainfall in July and August fall in 24 hours).

The background the general climate configuration generated microclimatic aspects appear relief that is located territory of the commune NicolaeTitulescu. Thus, in the lowlands on the wires of the valley and Vedea the river meadow drought is felt less because groundwater is shallow, the night temperature is lower due to colder currents.

In terms of microregion, territory of the commune is in micro-area Nicolae Titulescu: IIS-VS 63/3b – that warm-semiumed moderate climate in the lowland region, prevailing vertisols and vertic soils.

The entire assembly, soils have medium fertility, fine texture, aeration porosity is very small, very high resisting soil works.

Soil types found in the area studied are: Regosol (limestone), aluviosol (eutric, limestone, Gleyic, coluvic) Faeoziom (pelic) Preluvosol (typically mollic, vertic, stagnant), Pelosol (argic, stagnant) and Vertosol (typically, brown, stagnant, nodulocalcaric).

The territorial administrative unit Nicolae Titulescu, Vertosolul (Fig. 1) is the dominant soil type (53.30%), followed by Preluvosol (22.48%), which on most of the vertic character, Pelosol (14.04%), Faeoziom (7.34%), aluviosol (2.33) and Regosol (0.50%).

Agricultural production is negatively influenced by the restrictions given by some properties of soil, terrain and climate, which show equal intensities, different production decreases depending on the use of land (arable, pasture, vineyard), so one and the same land may have restrictions different intensities depending on how you use it.

The principle of the assessment requirements of land is a comparison of land use features offered land. The set then considered restrictive factors or properties intended purpose and influence (if possible quantitative) of each of these factors or properties.

In this research, limiting factors (restrictive) of agricultural production are represented mainly by climatic conditions, relief and soil.

Restrictions refer to conditions that deplete the crops and the risk of occurrence of degradation operating with the same effect. It is though, some restrictions are improved and that the Land can be operated close to optimum conditions and other restrictions are unimproved.

Restrictions order regime climate refers to air temperature and average annual rainfall.

Air temperature regime does not restrict the current structure of land use categories of use, it can be considered optimal for growth and development of most crops in the area.

Average annual rainfall on the whole studied area is considered relatively favorable current way of land use.

Restrictions relate in particular relief to relief slopes, the landscape of meadow, the wires of the valley and plateau landscape.

The landscape of the valley bottoms restrict agricultural production through relatively frequent flooding and silting cultures eroded material on the slopes.

Relief plateau (plan) which provides good conditions for external drainage of rain water, restricting agricultural production through the stagnation surface.

Slope and surface soil erosion occurs on relatively small areas.

Limiting factors (Fig. 2) of agricultural production are represented by:

• Excess moisture occurs on a ground area of 22 ha;

• Excess moisture stagnant manifests an area of 55 ha;
• Coarse soil texture affects an area of 5 ha and fine texture affects an area of 990 ha;
• Over 5% slope occurs over an area of 20 ha;
• Erosion of the surface affects an area of 64 ha;
• Inundability land by flood affecting an area of 23 ha;
• The degree of compaction adversely affects an area of 985 ha;
• Unevenness occurs on a land area of 51 ha.
• Moderate acid reaction occurs un an area of 20 ha.

Assignment land pretability classes was made on the basis of factors limiting agricultural production in relation to existing uses when research soil (arable, pasture and vineyards – Fig. 3).

Depending on the and intensity of expression of the limiting factors, the land of the investigated area was divided into 3 (three) categories of pretability for such uses, denoted by Roman numerals. (Fig. 4).

Class II – land pretability good, with low limits, the danger of soil degradation can be removed with the use of restrictive technology specific current cultural.

Class III - land pretability middle, with moderate limitations for that use and need to prevent degradation and / or improvement measures agropedoameliorativ.

Class IV – land with low pretability (marginal), with severe limitations for that use. It reduces the systematic appreciation and require intensive crop improvement or development.

Agricultural area of 2015 ha within the class II of pretability.

Figure 1 The soil from the investigated area (Vetisols of Nicolae Titulescu)

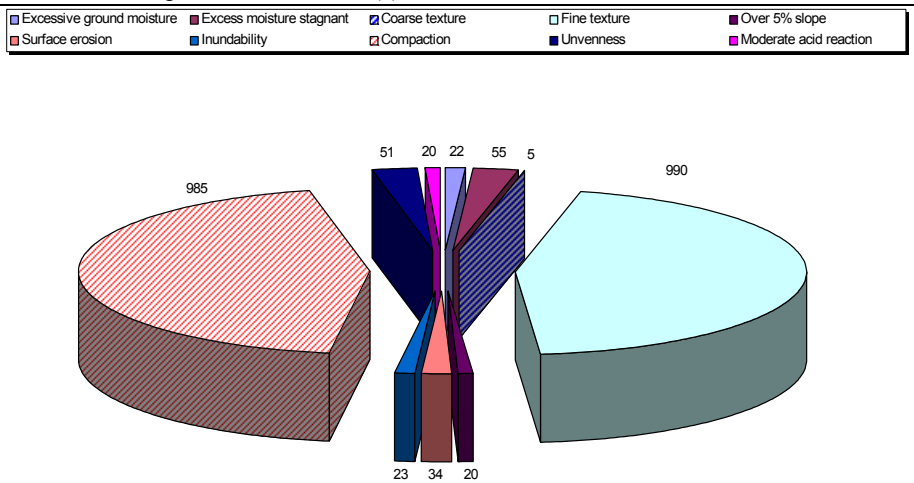

Figure 2 The limiting factors of agricultural production in the researched area

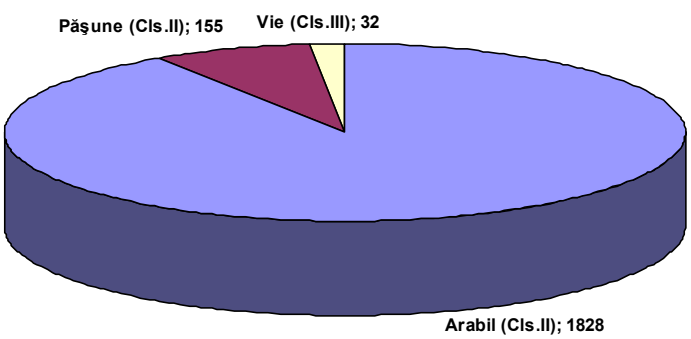

Figure 3 Grouping agricultural land by use cathegories of pretability classes (Nicolae Titulescu Administrative-Territorial Unit)

Gruparea terenurilor pe categorii de folosinţă în clase de pretabilitate - Unitatea administrativ-teritorială NICOLAE TITULESCU (ha)

Agropedoameliorative measures and special nedds has been drawn on the basis of the limiting factors of agricultural production, the group depending on the pretability of the land uses (arable, pasture and vineyards).

Leveling the capital - is recommended to run on an area of 1.90 ha (arable).

Regularisation of stream - usually run after sowing crops using for this purpose plow or thinning.

This work is recommended to perform a total area of 24 ha, of which 19 hectares (arable) and 4 hectares (pasture).

Surface drainage - is running in order to restore, maintain and increase production capacity of soils undergoing intense degradation processes of the state of fertility by stagnation on the surface profile.

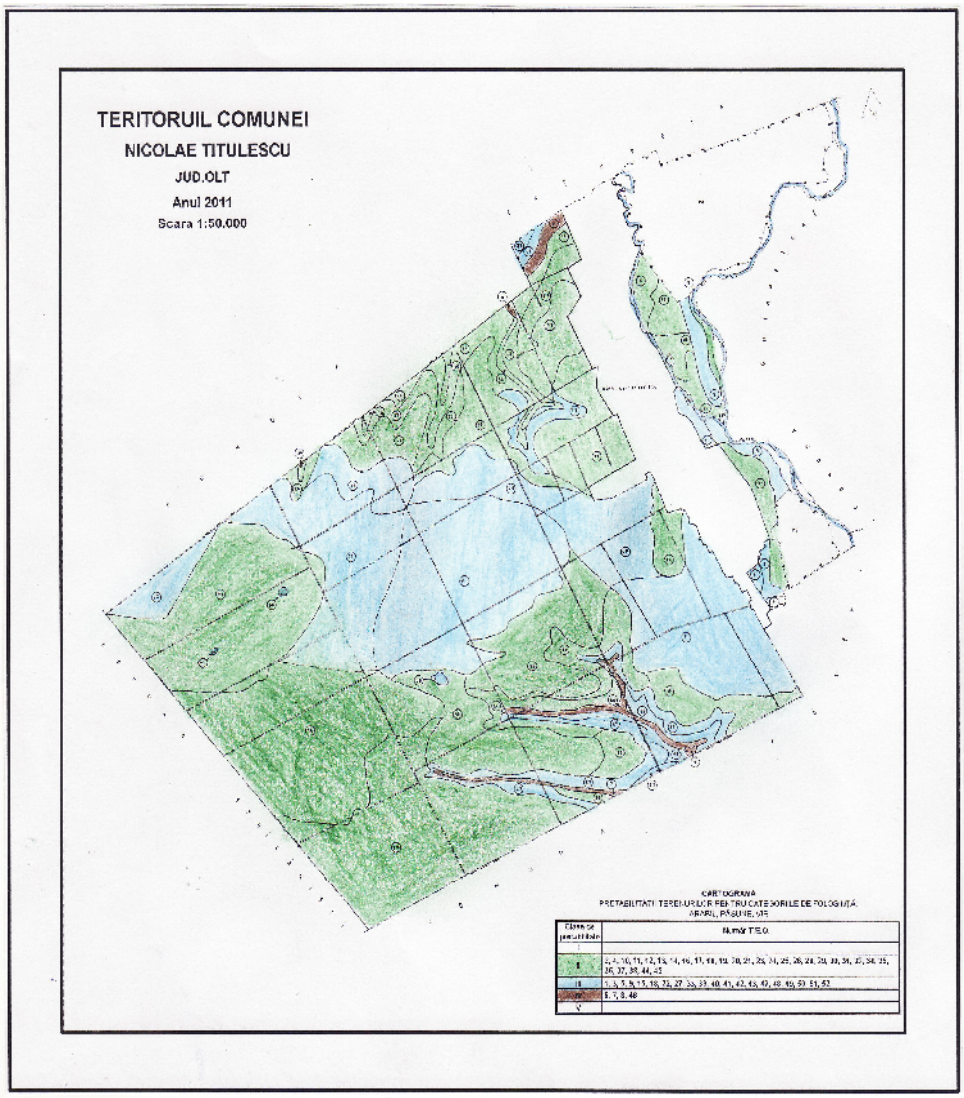

Figure 4. Cartogram land use categories: arable, pasture and vineyards

It is recommended to run on a total area of 54.90 ha, 38.90 ha (arable), 4 ha (pasture) and 12 hectares (vineyards).

Dams - is recommended in the thread valleys flooded areas in periods of excessive precipitation.

This work recommends a total area of 24 ha, of which 19 hectares (arable) and 4 hectares (pasture).

Amendment of calcium - to recommend a total area of 20ha of which 10 hectares (arable) and 10 hectares (pasture).

Amendment of calcium is all work to optimize reaction and base saturation status of acid soils in order to obtain higher yields as with maximum economic efficiency in terms of maintaining and enhancing soil fertility continues.

Surface drainage - is recommended by excess moisture on land where soil moisture status than field capacity and comes close to saturation. Affected area is 32.90 ha, 28.90 ha (arable) and 4 hectares (pasture).

Profound aerates by scarification running on soils with fine texture, moderately compress and temporarily affected by excess moisture stagnant, it is recommended a total area of 990 ha, of which 985 ha (arable) and 5 ha (vineyards).

Fertilization radical - it is recommended to run on an area of 21 hectares (vineyards).

CONCLUSIONS

• Agricultural area Nicolae Titulescu territorial administrative unit (2015 ha) falls within Class II pretability, pretability that good, with low limits, the danger of soil degradation can be removed with the use of restrictive technology specific current cultural.

• Dominant limiting factor is the very fine soil texture affects an area of approx. 990 ha.

• Limiting factors of agricultural production can be improved by means of the reach of local farmers or from investment funds.

ACKNOWLEDGEMENTS

The paper is published by Project „Studies Doctoral Training In Research (For-Ce)" ID 80127 in the doctoral school of USAMVB Timisoara

BIBLIOGRAPHY

1. BLAGA GH, LAURA PAULETTE, UDRESCU S, FILIPOV F, RUSU I, VASILE D, 2008 - Pedologie, Editura Mega Cluj-Napoca, pag. 437-440
2. BORZA I., 1997 - Ameliorarea şi protecţia solurilor, Editura Mirton, Timişoara, pag. 39-95
3. COTEŢ P, VESELINA URUCU , 1975 - Judeţul Olt, Editura Academiei RSR Bucuresti, pag 26-34, 42
4. FLOREA N, BĂLĂCEANU V, CANARACHE A., 1987 - Meodologia Elaborarii Studiilor Pedologice, vol I, II, III, ICPA Bucuresti
5. FLOREA N., MUNTEANU I., 2003 - Sistemul Român de Taxonomie a Solurilor, Ed. Estfalia, Bucureşti
6. IAGARU GH., VĂTĂMANU V.V., BĂLĂNESCU D., 2001 - Clima şi solurile judeţului Olt, Editura Sitech , Craiova
7. ŢĂRĂU D., 2009 - Bonitarea şi evaluarea terenurilor, Editura Agroprint, Timişoara, pag 241-250
8. ***, 1980 - Monografia judeţului Olt: Editura Sport-Turism,Bucureşti
9. ***, 2011 - OSPA Olt - Studiu pedologic si agrochimic, teritoriul comunei Nicolae Titulescu, judetul Olt