

## AGROCHEMICAL STUDY IN THE AREA OF SILIȘTEA-GUMEȘTI TELEORMAN COUNTY, WITH AN AREA OF 210 HA, WITH THE PURPOSE OF ELABORATING THE FERTILIZATION PLAN ON CROPS

MUȘAT IULIAN BOGDAN<sup>1\*</sup>, MIHALACHE MIRCEA<sup>1</sup>,  
MUȘAT MARIAN<sup>1</sup>, MADJAR ROXANA<sup>1</sup>

<sup>1</sup>Soil Science Department, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Bd. Marasti, No 59, Bucharest, Romania

\*Corresponding author: [iulian\\_bogdan93@yahoo.com](mailto:iulian_bogdan93@yahoo.com)

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### ABSTRACT

In order to carry out this study, work was carried out on the morphological, physical and chemical characterization, determining the productive potential of the soil cover, enunciating the measures of soil improvement and elaborating the fertilization plan on crops.

The field stage includes the presentation of general and local ecopedological conditions. In this regard, observations were made on the territory from the point of view of each ecopedological factor. Based on the movement on the ground, observations were made on the micro-relief, the level of the groundwater, the vegetation and the degree of anthropization of the soil cover following the mobilization, preparation of the germination bed and current maintenance.

The soil samples were collected according to the cadastral plan, with an area of 210 ha being located on the radius of SilișteaGumești commune, Teleorman county. For the characterization of the soil cover from the above mentioned surface, a soil profile and a few surveys were carried out, in order to correctly identify the representative soil type.

Also, agrochemical mapping was performed, 44 soil samples were collected from the arable horizon (0-20 cm) in disturbed system (in plastic bags).

The description of the pedogenetic conditions and the soil cover from soil boiling, was carried out according to the "Guide for the description in the field of the soil profile and the specific environmental conditions", authors: Munteanu I., Florea N., 2009 and "Methodology for the Development of Pedological Studies ", ICPA, 1987. The classification of soils at type and subtype level was made according to" Romanian Soil Taxonomy System (SRTS) ", ICPA, 2012.

### INTRODUCTION

This study, scientific research under contract no. 1187/09.11.2016 between SC Agrilemi SA, as beneficiary and the University of Science Agronomy and Veterinary Medicine in Bucharest - as a performer.

The object is to control the execution of a research entitled "Development of soil and agrochemical study to elaborate the plan of fertilization on crop area of 210 ha. For this study were carried out works on

morphological characterization, physical and chemical, determining the production potential of the soil cover, stating the

measures to improve soil and crop fertilization plan development, with recommendations on the types of fertilizers.

## MATERIALS AND METHODS

Soil sampling agrochemical middle of plowed horizon (0-20 cm) were composed of 15-20 individual samples from the surface sampling plots of ground. The parceling of land, was considered pedological complexity, uniformity of land utilization, crop structure so that each sample representing a plot as uniform. The results were analyzed and interpreted based on the standards contained in the catalog A.S.R.O. that are consistent with international standards.

*Methods of analysis used to determine the chemical characteristics:*

Organic matter (humus): determined by volumetric wet oxidation method after Walkley-Black, the change Doughnut - STAS 7184 / 21-82

Carbonates - gasometric method using calcimetricul Scheibler after SR ISO 10693: 1998 (%)

Nitrogen content was determined indirectly (by calculation) based on the humus content and degree of saturation with bases.

$$IN = \text{humus} \times V / 100$$

Accessible phosphorus (P mobile): after Egner-Riehm-Domingo and dosed with molybdenum blue colorimetric after Murphy-Riley method (reduction with ascorbic acid).

Available potassium (K mobile): extraction after Egner-Riehm-Domingo and determination by flame photometry.

pH: determined potentiometrically with a combined glass and calomel electrode in an aqueous suspension to the Soil / Water 1/2.5 - SR 7184 / 13-2001

The acidity of the hydrolytic - extraction with sodium acetate to pH 8, 2

Amount bases - Kappen method Schoffield Chirita by extraction with 0.05 normal hydrochloric acid

*Methods of analysis used to determine the physical properties:*

The apparent density (AD): the method of the metal cylinder of known volume (100 cm<sup>3</sup>) to the temporary humidity of the soil (g/cm<sup>3</sup>)

The total porosity (PT) by calculating (% by volume -% v / v)

The coefficient of hygroscopic (CH) drying at 105 ° C of a sample of soil moistened in advance in equilibrium with an atmosphere saturated with water vapor (in the presence of a solution of H<sub>2</sub>SO<sub>4</sub>, 10%) -% by weight (% w/w).

Coeficientul de ofilire (CO): prin calcul, prin multiplicare cu 1,5 a coeficientului de higroscopicitate, determinat prin metoda Mitscherlich modificată (fără vid, cu probă martor) -% de greutate (% g/g).

## RESULTS AND DISCUSSIONS

***Chromic luvisoil mollic subtype (EL – rs. mo)***

***Rock: Loess***

***Relief: Plain, horizontal surface***

***Groundwater: > 10 m***

***Use: Arable***



**Fig. 4.1. Soil type**

**Am (0-32 cm)**, powdered clay, with shades of 7.5 YR 2/2 for the wet material and 7.5 YR 3/2 for the dry material; the structure is gravelly well developed at the top of the horizon and polyhedral average developed at its base,

**AB (32-64 cm)**, clay-powdered clay, with shades of 7.5 YR 3/2 in the wet state material and 7.5YR 3/3 in the dry state material, with moderately developed polyhedron structure, moderately tared, hard in the wet state, hard in the dry state, moderately plastic and adherent;

**Bt1 (64-135 cm)**, argillaceous, uniform color in shades of 7.5 YR 4/3 in the *Physico-chemical characterization of soil profile*

The physico-chemical properties of this type of soil are in accordance with their physico-geographical formation conditions. The analytical data for the red-typical preluvosolare presented in table 1.

When establishing the fertilization plan, the general pedological characterization of the soils, the agrochemical indices, the crops and their requirements, the level of the productions specified in the plan are taken into account.

wet material and 7.5 YR 5/4 in the dry material, the structure is average columnar and prismatic and big; the material is very strong in the wet state and very hard in the dry state, very plastic and adherent,

**Bt2 (135-186 cm)**, argillaceous, uniform color in shades of 7.5 YR 4/4 in the wet material and 7.5 YR 5/6 in the dry material, the structure is medium and large prismatic, frequent fine cracks; the material is very hard in the wet state.

**Ck (> 186 cm)**, medium clay clay, with shades of 7.5 YR 5/4 in the wet material and 7.5YR 6/6 in the dry material, the material is unstructured.

It should be noted that the ICPA indications were used in determining the doses, which correlated the results of long-term fertilizer experiments on different soil types with agrochemical indices characteristic of these soils and the evolution of agrochemical fertility.

Table 1

**Physical and chemical analyzes of EL rs-mo soil from the studied territory**

| Horizont                          | Am   | AB    | Bt <sub>1</sub> | Bt <sub>2</sub> | Ck    |
|-----------------------------------|------|-------|-----------------|-----------------|-------|
| Dept (cm)                         | 0-32 | 32-64 | 36-135          | 135-186         | > 186 |
| Sand gr. (2-0,2 mm)               | 19.4 | 17.3  | 16.1            | 11              | 26.5  |
| Sand fin (0,2-0,02 mm)            | 16.6 | 14.6  | 10.9            | 9.5             | 19.5  |
| Dust (0,02-0,002 mm)              | 34   | 28.5  | 25              | 27.5            | 18    |
| Clay (< 0,002 mm)                 | 30   | 39.6  | 48              | 52              | 36    |
| Texture                           | LP   | TP    | AL              | AL              | TT    |
| pH                                | 5.7  | 5.8   | 6.2             | 6.5             | 7.2   |
| Humus (%)                         | 3.2  | 2.3   | 1.7             | 1.3             | 0.8   |
| Bulk density (g/cm <sup>3</sup> ) | 1.31 | 1.41  | 1.46            | 1.47            | 1.39  |
| Total porosity (%)                | 48.5 | 46.2  | 45.7            | 45.7            | 47.7  |
| Degree of compaction GT (%)       | -2,4 | 3,2   | 14,3            | 15,3            | 4,1   |
| Carbonates (%)                    | 0    | 0     | 0               | 0               | 9.7   |
| Phosphorus (ppm)                  | 32   | 23    | 18              | 10              | -     |
| Potassium (ppm)                   | 254  | 167   | 112             | 67              | -     |
| Coefficient of hygroscopic (%)    | 2.43 | 1.79  | 1.36            | 1.05            | -     |
| Wilting coefficient %             | 76   | 78    | 80              | 81              | 92    |
| Field capacity %                  | 7.9  | 9.2   | 12.3            | 12.2            | 4.7   |
| Usable water capacity%            | 1.9  | 13.8  | 16.9            | 18.3            | 12.7  |
| Total capacity (%)                | 21.2 | 25.1  | 24.2            | 24.5            | 23.5  |
| Humus reserve (t/ha)              | 9.3  | 11.3  | 7.3             | 6.2             | 10.8  |

The doses of chemical fertilizers are expressed in kg.s.a./ha, and the total quantities per unit are calculated.

Table 6.2(a)

**Recommendations regarding the doses of chemical fertilizers and amendments based on agrochemical analysis**

| PAO | BF   | Supr. (ha) | Pre-culture | Post - culture | Proposed production (t/ha) | Determination effected (medium) |           |          |          |      |       |
|-----|------|------------|-------------|----------------|----------------------------|---------------------------------|-----------|----------|----------|------|-------|
|     |      |            |             |                |                            | pH                              | Humus (%) | P mobile | K mobile | IN   | V (%) |
| 1.  | 340  | 55,88      | Wheat       | Sun fl         | 4 000                      | 5,63                            | 3,58      | 33       | 177      | 2,78 | 78    |
| 2.  | 160  | 104,40     | Wheat       | Maize          | 10 000                     | 5,60                            | 3,48      | 34       | 201      | 2,73 | 79    |
| 3.  | 184  | 22,48      | Wheat       | Maize          | 10 000                     | 5,61                            | 3,61      | 43       | 214      | 2,8  | 77    |
| 4.  | 181  | 41,0       | Wheat       | Maize          | 10 000                     | 5,52                            | 3,37      | 45       | 220      | 2,57 | 76    |
| 5.  | 177  | 54,27      | Wheat       | Wheat          | 7 000                      | 5,51                            | 3,48      | 42       | 208      | 2,6  | 75    |
| 6.  | 35   | 66,48      | Barley      | Sun fl         | 4 000                      | 5,57                            | 2,92      | 36       | 187      | 2,2  | 76    |
| 7.  | 1340 | 42,26      | Wheat       | Maize          | 10 000                     | 5,32                            | 3,32      | 31       | 196      | 2,39 | 73    |
| 8.  | 1401 | 11,95      | Wheat       | Maize          | 10 000                     | 5,31                            | 2,86      | 42       | 167      | 2,09 | 72    |
| 9.  | 123  | 46,70      | Wheat       | Wheat          | 7 000                      | 5,29                            | 3,09      | 36       | 191      | 2,32 | 71    |
| 10. | 75   | 26,78      | Wheat       | Maize          | 10 000                     | 5,46                            | 3,08      | 38       | 219      | 2,4  | 78    |

When incorporating chemical fertilizers, it is necessary to convert the doses expressed in active substance, in quantities of raw fertilizers, according to their content in active substance.

This is especially required by the varied assortment of simple and complex

chemical fertilizers, if the fertilizers are insufficient at the date of fertilization they can be incorporated and fractionated, Taking into account the nutritional characteristics of the species in different phases (phenophases) of development.

Table 6.2(b)

| PAO | BF   | Supr. (ha) | Pre-culture | Post-culture | Proposed production (t/ha) | N (kg s.a./ha) | P <sub>2</sub> O <sub>5</sub> (kg s.a./ha) | K <sub>2</sub> O (kg s.a./ha) |
|-----|------|------------|-------------|--------------|----------------------------|----------------|--|-------------------------------|
| 1.  | 340  | 55,88      | Wheat       | Sun fl       | 4 000                      | 120            | 70   | 90                            |
| 2.  | 160  | 104,40     | Wheat       | Maize        | 10 000                     | 170            | 120  | 100                           |
| 3.  | 184  | 22,48      | Wheat       | Maize        | 10 000                     | 170            | 120  | 100                           |
| 4.  | 181  | 41,0       | Wheat       | Maize        | 10 000                     | 170            | 120  | 100                           |
| 5.  | 177  | 54,27      | Wheat       | Wheat        | 7 000                      | 170            | 125  | 80                            |
| 6.  | 35   | 66,48      | Barley      | Sun fl       | 4 000                      | 120            | 70   | 90                            |
| 7.  | 1340 | 42,26      | Wheat       | Maize        | 10 000                     | 170            | 120  | 100                           |
| 8.  | 1401 | 11,95      | Wheat       | Maize        | 10 000                     | 170            | 120  | 120                           |
| 9.  | 123  | 46,70      | Wheat       | Wheat        | 7 000                      | 170            | 120  | 100                           |
| 10. | 75   | 24,78      | Wheat       | Maize        | 10 000                     | 170            | 120  | 100                           |

## CONCLUSIONS

The studied territory belongs to the outskirts of the town of Siliștea-Gumești, located in the northwest of Teleorman county, geographically classified in the Roman Plain, the Burdea subunit, between Vedea and Teleorman, characterized by a temperate continental climate, specific relief of transition plains and plateaus, weakly inclined, with groundwater over 10 m;

The surface studied in TC Siliștea-Gumești, Teleorman county, is 210 ha, arable land, from which a total of 24 soil samples were collected; The soil cover is in accordance with the physical-geographical conditions of the area, being identified a single soil type

with a zonal character, namely red glove - typical.

The parental material consists predominantly of fine clay and loessoid deposits;

The main limiting factors of the production potential are the poor precipitation during the vegetation period, the presence of the argic horizon (Bt), which gives the plants a less favorable aërohydic regime and the reaction of the moderately acidic soil in the upper horizon (bioaccumulation);

The soil reaction is moderately acidic with pH values between 5.23 and 5.72 which is why it is recommended to correct the reaction by applying calcium-

based amendments or fertilizers with physiologically alkaline reaction;

The supply of nitrogen, represented by the nitrogen index (IN) is small-medium, with values between 1.95 and 3.00%;

The supply with mobile phosphorus is medium-large for the entire studied area, with values between 25-52;

The supply of mobile potassium is the same as in the case of phosphorus,

medium-high, with values between 159 and 227;

Due to the clay-clay texture, the values of the hydrophysical indices are below the optimum limits, giving the plants a less favorable aërohydrous regime.

Fertilization with NP / NPK complex (20:20) / (15:15:15) and nitrocalcar (CAN azomures = 27% N + 7% CaO + 5% MgO or NAC Linzer = 27% N + 12.5% is recommended As a).

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