

## CHANGES OF SOIL PROPERTIES RESULTING IN A MOLD HUMAN INTERVENTION VERT FROM GIARMATA

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**Abstract.** Located in north-central area of Timis County (45°83' north latitude and 21° 32' east), DJ 691, Giarmata town lies at a distance of 11 km from Timisoara and the DC 58 to 1.3 km from the International Airport „Traian Vuia” Timisoara. The total land area of the village is 7150 ha of which 6292 ha is agricultural land and 43.5 ha are forest. From the geomorphological, the common fall - Crisan Banato Plain, part of the Western Plain of Romania, the eastern extremity of the Tisza Plain. The altitude ranges from 100-178 m. The research was conducted over a period of five years, ie years 2009-2013 in the area Giarmata Timis County. The soil in the study is a vertic chernozem, gleyed weak. In order to accomplish this work, we studied the modification of morphological properties, physical, chemical and hydro as a result of human intervention. I stepped through the application of river sand, manure, manure, fertilizers and drip irrigation and sprinklers. Peculiarities of the microclimate of the territory are determined by its geographical position, so that it is characterized by a temperate continental climate with mild winters and short, being frequently under the influence of cyclone activity and air masses crossing the Mediterranean and Adriatic general features of climate marked by diversity and irregularity of atmospheric processes. Average yearly temperature after Timișoara Meteorological Station is 10.9° C and mean yearly rainfall is 631.0 mm, data indicating a process of aridity in the existence of significant oscillations ie 390.5 mm (between 1999 and 2000) and 908.1 mm ( between 1969 and 1970). The investigated part of Bega catchment, basin Bega - Beregsău, waterways most important being Beregsăul, Luchini, Magherus and Niaradul. Plants are grown mainly wheat, maize, sunflower, sugar beet, potato, tobacco, clover, alfalfa, soybeans, some legumes, vines and tree species existing between nominate plum, apple, cherry, cherry, apricot, quince and walnut; researches were made vegetable is cultivated tomatoes, eggplants and peppers.

**Keywords:** soil property change, fertilization, anthropogenic intervention.

### INTRODUCTION

Located in north-central area of Timis County (45 ° 83 'north latitude and 21 ° 32' east), DJ 691, Giarmata town lies at a distance of 11 km from Timisoara and the DC 58 to 1.3 km from the International Airport Traian Vuia "Timisoara (figure 1). The total land area of the village is 7150 ha of which 6292 ha is agricultural land and 43.5 ha are forest. From the geomorphological, the common fall-Crisan Banato Plain, part of the Western Plain of Romania, the eastern extremity of the Tisza Plain. The altitude ranges from 100-178 m . The studied soil type was a gleyed weak vertic chernozem.

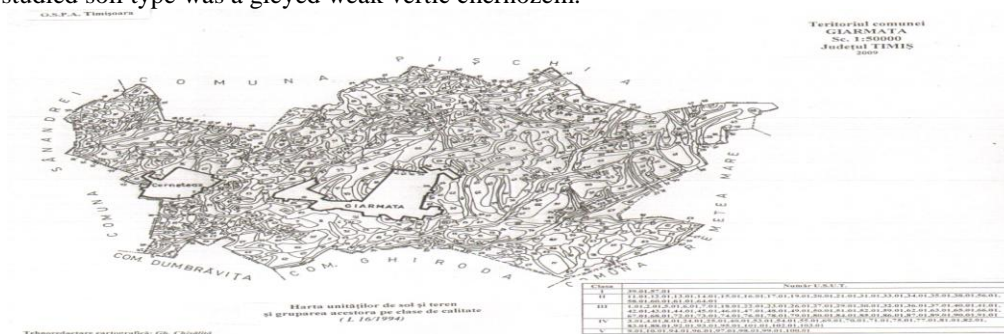


Figure 1. Map Giarmata commune, Timiș (after OSPA Timișoara 1998)

### MATERIALS AND METHODS

We determined the physical properties of the soil, as texture, by Cernikova method, the density of the ground by pycnometer method, the bulk density, by the brass cylinder, the total and aerated porosity by calculation.

We determined the chemical properties of soil, as reaction, by electronic pH -meter and humus content Tiurin method.

### RESULTS AND DISCUSSION

In table 1 presents the analytical data from gleyed weak vertic chernozem from Giarmata after OSPA Timisoara and in table 2 are some soil properties occurred after the application of river sand at 15 t per ha, manure quantity 20 tonnes per hectare in 2009-2010, manure 35 t per hectare in 2011 and annual mineral fertilizer dose of 200-300 kg per hectare.

Table 1.

Analytical data of gleyed weak vertic chernozem from Giarmata, Timis county

| Horizonts                               | Ap    | Aphys | Amyz  | A/C          | C/Ak  | Cca   | Ccag   | Ccag  | CcaGo <sub>3</sub> |
|---|-------|-------|-------|--------------|-------|-------|--------|-------|--------------------|
| Depth (cm)                              | 0-23  | 23-38 | 38-50 | 50-64        | 64-76 | 76-95 | 95-130 | -160  | -200               |
| Coarse sand (2,0-0,2 mm)%               | 1,9   | 2,1   | 1,3   | 1,6          | 1,3   | 1,2   | 0,8    | 1,5   | 1,7                |
| Fine sand (0,2-0,02 mm) %               | 30,1  | 29,9  | 32,2  | 31,4         | 32,0  | 35,4  | 35,4   | 36,2  | 33,1               |
| Dust (0,02-0,002 mm) %                  | 25,6  | 26,0  | 24,1  | 25,4         | 25,0  | 27,3  | 27,6   | 24,6  | 24,7               |
| Clay (<0,002 mm) %                      | 42,4  | 42,0  | 42,1  | 41,6         | 41,7  | 36,1  | 36,2   | 37,7  | 40,5               |
| TEXTURE                                 | TT    | TT    | TT    | TT           | TT    | TT    | TT     | TT    | TT                 |
| Soil density (D g/cm <sup>3</sup> )     | 2,65  | 2,68  | 2,70  | 2,72         | 2,72  | 2,72  |        |       |                    |
| Aparent density (DA g/cm <sup>3</sup> ) | 1,01  | 1,48  | 1,39  | 1,43         | 1,46  | 1,34  |        |       |                    |
| Total porozitaty (PT %)                 | 61,9  | 47,0  | 48,5  | 47,4         | 46,3  | 50,7  |        |       |                    |
| Aeration porosity (PA %)                | 35,2  | 9,5   | 11,8  | 9,8          | 7,9   | 16,0  |        |       |                    |
| Degree of compaction (GT %)             | -19,2 | 9,3   | 6,5   | 8,5          | 10,6  | 0,4   |        |       |                    |
| Coef.de wettability (CH %)              | 8,9   | 8,8   | 8,9   | 8,8          | 8,8   | 7,6   |        |       |                    |
| Wilting coefficient (CO %)              | 13,4  | 13,2  | 13,4  | 13,2         | 13,2  | 11,4  |        |       |                    |
| Field capacity (CC %)                   | 26,4  | 26,4  | 26,4  | 26,3         | 26,3  | 25,9  |        |       |                    |
| Total capacity (CT %)                   | 61,3  | 33,1  | 34,9  | 33,1         | 31,7  | 37,8  |        |       |                    |
| Water Capacity useful (CU %)            | 13,0  | 13,2  | 13,0  | 13,1         | 13,1  | 14,5  |        |       |                    |
| Cover. Maximum failure (CCD max. %)     | 34,9  | 6,7   | 8,5   | 6,8          | 5,4   | 11,9  |        |       |                    |
| Hydraulic conductivity (K mm/h)         | 14,0  | 0,96  | 1,20  | 1,0          | 0,95  | 2,20  |        |       |                    |
| pH (in H <sub>2</sub> O)                | 6,55  | 7,02  | 7,31  | 7,62         | 8,16  | 8,43  | 8,56   | 8,61  | 8,68               |
| CaCO <sub>3</sub>                       |       |       | 0,1   | 0,2          | 2,40  | 17,31 | 20,05  | 17,64 | 18,06              |
| Humus (%)                               | 3,48  | 2,44  | 1,47  |              |       |       |        |       |                    |
| Humidity %                              | 11,64 | 15,36 | 13,64 | 15,29        | 15,05 | 16,68 | 15,10  | 18,38 | 20,01              |
| Humus reserve (t/ha)                    | 80,8  | 54,2  | 24,5  | = 160,5 t/ha |       |       |        |       |                    |

Source: OSPA Timișoara, 1998

Table 2.

Soil properties from Giarmata Timis County after human intervention

| Horizonts                               | Ap    | Aphys | Amyz  | A/C   | C/Ak  | Cca    |
|---|-------|-------|-------|-------|-------|--------|
| Depth (cm)                              | 0-23  | 23-38 | 38-50 | 50-64 | 64-76 | 76-100 |
| Coarse sand (2,0-0,2 mm)%               | 15,9  | 11,1  | 8,5   | 3,9   | 1,3   | 1,2    |
| Fine sand (0,2-0,02 mm) %               | 37,7  | 28,9  | 28,3  | 31,3  | 32,0  | 35,4   |
| Dust (0,02-0,002 mm) %                  | 25,3  | 28,0  | 24,1  | 23,5  | 25,0  | 27,3   |
| Clay (<0,002 mm) %                      | 21,10 | 32,0  | 39,1  | 41,3  | 41,7  | 36,1   |
| Soil density (D g/cm <sup>3</sup> )     | 1,14  | 1,40  | 2,65  | 2,72  | 2,72  | 2,72   |
| Aparent density (DA g/cm <sup>3</sup> ) | 1,67  | 1,48  | 1,39  | 1,43  | 1,46  | 1,34   |
| Total porozitaty (PT %)                 | 64,5  | 54,3  | 42,5  | 47,4  | 46,3  | 50,7   |
| Aeration porosity (PA %)                | 40,1  | 12,8  | 11,8  | 9,8   | 7,9   | 16,0   |
| pH (in H <sub>2</sub> O)                | 6,80  | 7,20  | 7,30  | 7,60  | 8,16  | 8,43   |
| Humus (%)                               | 4,90  | 3,73  | 2,14  |       |       |        |

As you can see the data in the two tables compared following the human intervention there is a significant change, especially in processed both horizontally at 0-23 cm depth data obtained from analyzes conducted as follows:

- Significantly increased sand content from 1.9 % to 15.9 % and from 30.1% coarse sand to 37.7 % at 0-23 cm depth;
- Dust content changed from 25.6% to 25.3%;
- Clay content showed a very significant decrease from 42.4% to 21.1 % ;
- Soil density experienced obvious changes from 2.65 g/cm<sup>3</sup> to 1.14 g/cm<sup>3</sup>;
- Apparent density was a clear increase from 1.01 g/cm<sup>3</sup> to 1.67 g/cm<sup>3</sup>;
- Total porosity increased from 61.9 % to 64.5 % and that of the aerator from 35.2% to 40.1%;
- Soil reaction changed from slightly acidic to neutral, pH values were changed from 6.55 to 6.8;
- Humus content increased significantly from 3.48% to 4.90%.

### CONCLUSIONS

As a result of human intervention in the chernozem Giarmata, it has changed significantly altered the original properties, especially at the surface, both horizontally processed as follows: increased content of coarse sand and coarse; a low clay content; decreased soil density values; have increased the apparent density was increased from 1.01 g/cm<sup>3</sup> to 1.67 g/cm<sup>3</sup>; The total porosity increased from 61.9% to 64.5% and the aeration from 35.2% to 40.1%; the pH value changed from 6.55 to 6.8 and the content of humus increased from 3.48% to 4.90%.

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