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RESEARCH REGARDING THE DETERMINATION OF THE MAIN PHYSICAL PROPERTIES OF THE FĂGET GLEY SOIL, TIMIȘ COUNTY, IN STRAWBERRY CROPS

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Abstract

The objectives of the papers were to characterize the natural framework, to identify and characterize the soil types and subtypes, to determine the physical properties of luvosoil in the Faget area, Timis County, Romania in strawberry crops. The physical properties of the gley soil were determined based on soil samples collected from a natural setting, on two depth levels, namely: 0-10 and 10-20 cm, during two various periods of the year, respectively, early spring, during March and autumn, during October. The research was carried out during two years, namely: 2013 and 2014, managing the following analyses, and the following methods: soil density; apparent density; total porosity and aeration porosity. The soil density registered values ranging from 2.43 g/cm^3, at the 0-10 cm depth and 2.48 g/cm^3, at the 10-20 cm depth. The soil apparent density registered values ranging from 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm^3, at a 10-20 cm depth, in October. The total soil porosity presented values ranging from 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm depth, in March 2013 and 2014. The soil aeration porosity presented values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

Key words**:** *culture, density, pedo-genesis processes, physical property, porosity, soil*

INTRODUCTION

The town of Făget is situated on the south-western part of Romania, in the contact area of the Lugojului Plain and Lugojului Hills, on the superior Bega river stream. [12]
Situated in the East of the Timiș county, it lies at a 98 km distance from Timisoara and 33 km form Lugoj, linked by the national road DN68A. The same road towards east links the town with Deva, at a 68 km distance. [1]
The town is also crossed by the Lugoj-Ilia railroad. [11]
The plain occupies around half of the researched area, and represents the lowest morphologic step, with hypsometric values ranging from 75 to 200 m. [6]

MATERIALS AND METHODS

The researched soil is a gley soil situated within the built-up area of the town of Făget, Timiș county, and used as a strawberry plantation. [9] The strawberry plantation was founded in August 2012. The soil samples with this crop were sampled after its founding, respectively after planting the strawberry stools.
The paper aimed at determining the soil's main physical properties, based on soil samples collected from a natural setting, on two depth levels, namely: 0-10 and 10-20 cm, during two various periods of the year, respectively, early spring, during March and autumn, during October.
The research was carried out during two years, namely: 2013 and 2014, managing the following analyses, and the following methods:
SOIL DENSITY ***(cm^3)*** – with the help of the pycnometer, using distilled water; [5]
APPARENT DENSITY ***(cm^3)*** [7]
The density was calculated with the following formula:

$$DA = \frac{M_1 - M_2}{V}$$

where: DA –apparent density (in g/cm^3);

M_1 – mass of the soil filled cylinder with a metallic cap (g);

M_2 – mass of the empty cylinder with a metallic cap (g);

V – cylinder volume (cm^3).

TOTAL POROSITY PT (%) was calculated with the help of the following formula:

$$PT = \left(1 - \frac{DA}{D}\right) x100$$

AERATION POROSITY PA (%).[7] In order to calculate it, we used the values of hydrophysical and physical indices:

PA = PT - CC x DA

CC – water field capacity.

RESULTS AND DISCUSSIONS

In order to calculate the **soil density**, the soil samples were collected at two depth levels (0-10 cm; 10-20 cm), during the first year (2013), as well as the second one (2014), the data regarding soil density being presented in table and Fig. 1.

Table 1. Soil density determination (g/cm^3), on luvisol soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	2.44	2.43
		10-20	2.46	2.45
	October	0-10	2.45	2.46
		10-20	2.47	2.48

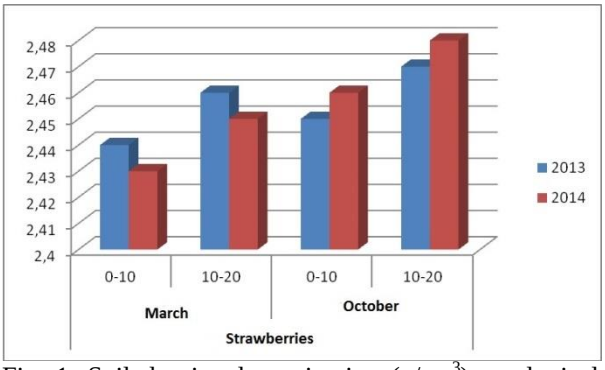

Fig. 1. Soil density determination (g/cm^3), on luvisol soil

From the above presented data, one can observe the fact that, on luvisol soil, the soil density registered values ranging from 2.43 g/cm^3, at the 0-10 cm depth and 2.48 g/cm^3, at the 10-20 cm depth.

In table and figure 2 the **apparent density** values are presented.

Table 2. Determining the soil apparent density (g/cm^3), in luvisol soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	1.16	1.17
		10-20	1.19	1.19
	October	0-10	1.17	1.18
		10-20	1.20	1.20

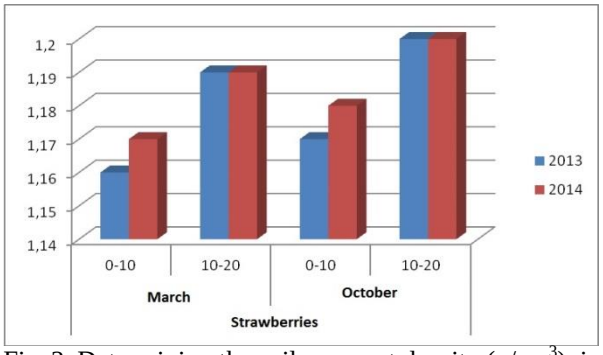

Fig. 2. Determining the soil apparent density (g/cm^3), in luvisol soil

From the above presented data, one can observe the fact that, on luvisol soil, the soil apparent density registered values ranging from 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm^3, at a 10-20 cm depth, in October.

Between the apparent density and the porosity there is a correlation that can be used when categorising soils into porosity classes. **Soil porosity** is a very important characteristic, since plants and microorganisms can find better life conditions only between certain aeration and capillary porosity, the data regarding its values being presented in table and figure 3.

Table 3. Determining the total soil porosity (%), in Luvic soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	45	45
		10-20	44	44
	October	0-10	43	43
		10-20	42	41

In luvic soil, the total soil porosity presented values ranging from 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm

depth, in March 2013 and 2014.

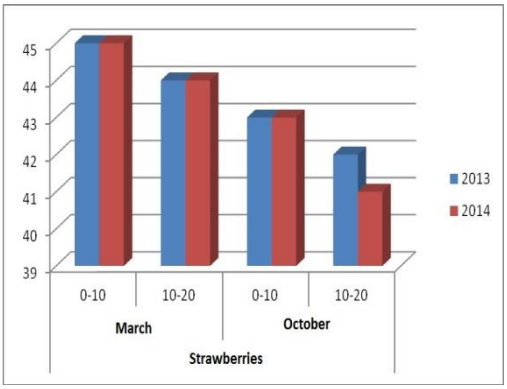

Fig. 3. Determining the total soil porosity (%), in Luvic soil

The aeration porosity as well as the total porosity is very important for fruit tree plantation, and thus for obtaining fruit productions.

Organic fertilizers are the ones leading to the most significant soil aeration porosity values, as one can observe in table and graph 4.

Table 4. Determining aeration porosity (%), in luvic soil

Crop	Month	Depth (cm)	Year	
			2013	2014
Strawberries	March	0-10	13.90	13.30
		10-20	12.60	12.00
	October	0-10	12.70	11.40
		10-20	12.10	10.90

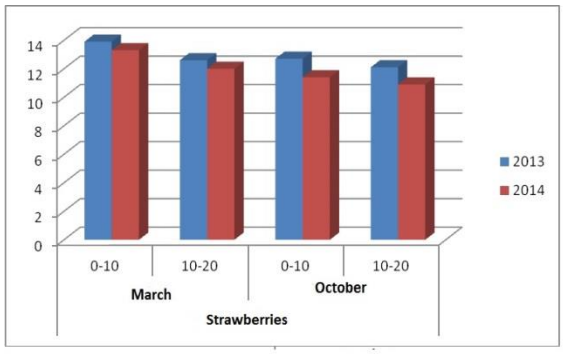

Fig. 4. Determining aeration porosity (%), in luvic soil

In luvic soil, the soil aeration porosity presented values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

CONCLUSIONS

Regarding the geographic setting, the town of Făget is situated in the south-western part of Romania, in the contact area of the Lugojului Plain with the Lugojului Hills, on the superior Bega river stream.

Regarding the pluviometric regime, for the entire year, the number of rainy days varies in the plain area between 120 and 130. The study of the multiannual pluviometric regime fluctuations revealed a net interval differentiation. Thus, during the years considered to be rainy, the pluvial water excess is due to a restricted number of months (3 – 4) when the water quantities exceed 80 mm. The rest of the months usually present values close to the multiannual averages, some being even droughty.

From the presented data, one can draw the following general conclusions:

The soil density registered values ranging from 2.43 g/cm^3, at a 0-10 cm depth and 2.48 g/cm3, 10-20 cm depth.

The apparent soil density registered values between 1.16 g/cm^3, at a 0-10 cm depth, in March 2013 and 1.20 g/cm3, at a 10-20 cm depth, in October.

The total soil porosity registered values between 41%, at a 10-20 cm depth, in October 2014 and 45%, at a 0-10 cm depth, in March 2013 and 2014.

The soil aeration porosity registered values ranging from 10.90%, at a 10-20 cm depth, in October 2014 and 13.90%, at a 0-10 cm depth, in March 2013.

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