THE STUDY ON THE POSSIBILITY OF THE SOIL SUCTION SIMULATION STUDY OF SOILS FROM BREAZU AND DANCU AREAS THROUGH THE SOIL PARAMETER ESTIMATOR SOFTWARE

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Abstract

To determine the soil suction is needed a previously analysis of the retention capacity (storage). In achieving this paper aims to present a method to study the retention of two types of soils taken from Breazu and Dancu study areas, at four harvesting depths (0-20 cm, 20-40 cm, 40-60 cm and 60-80 cm) through the simulation technique implemented with the help of SOIL PARAMETER ESTIMATOR software who needed a data series of bulk density - previously determined for each harvest depth. Following the introduction of data entry, the software generated a total of eight suction curves, one for each depth, corresponding to study areas mentioned above.

Key words: Soil Parameter Estimator, suction curves, bulk density

Soil structure put a direct influence on the aerohidric and thermal regime of soils and ensuring optimal conditions for seed germination, plant sunrise and root system development, as well as certain mechanical properties may make the necessity and effectiveness of future technological worksAccording to studies conducted by some researchers in this field we can affirm that retention of soil that still bears his name and soil suction necessitated always special attention because of the importance it has when you wish determination of a multitude of hydrophysical who may have a significant impact on soil fertility.

Besides the soil structure another basic physics of the pedologic foundation is represented by soil texture.

Texture is one of the most important soil properties which depend on the nature of soil parent material and evolution of soil formation processes (Rogobete G., 1993).The role of texture presents some aspects including: texture put a large influence on solification process, a coarse texture allows a more intense leaching, a broader development of the profile, but a fine texture opposes leaching accented create profiles shorter horizons better differentiated and stimulates the accumulation of humus, texture determines and/or greatly influence soil properties. (Filipov F., Lupaşcu Gh., 2003).

In general (Canarache, 1990) a rough textured can cause the following: high permeability to water and air, small capacity of water retention, low containing of humus and nutrients, underrepresented colloidal complex, compared to the fine type of texture when she in turn displays some advantages and disadvantages for examples: low permeability for water and air, high water retention capacity, greater compactness, high humus content and nutrients, complex colloidal well developed, potential fertility (Lăcătuşu R., 2000).

MATERIAL AND METHOD

All research was conducted on soil samples disturbed (stored in labeled bags) and undisturbed harvested (collected by the method of metallic cylinders with a volume of 100 cm^3) shown in *figure 1.a and b*)

All samples was collected at 4 depth (0-20 cm, 20-40 cm, 40-60 cm and 60-80 cm) from two locations – Breazu and Dancu (Dumitru., 2009).

Physical properties were analyzed in the laboratory with the following methods: soil bulk density (oven drying method *figure* 2 a), texture (pipetting method performed using Eijkelkamp Pipette Apparatus and other tools *figure* 2 b)

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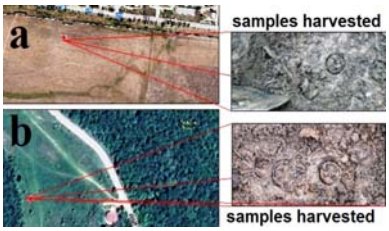

Figure 1 **Presentation of the location study**
a) zone of Dancu sampling soil, b) zone of Breazu sampling soil

Figure 2 **Equipment used to analyze the physical properties:**
a) drying machine b) Eijkelkamp Pipette Apparatus and other tools used for determination of soil texture

Besides the equipment shown in Figure 2 in determining the soil suction was applied Soil Parameter Estimator program.

Soil Parameter Estimator program has generated a diagram of soil texture for simple operation which needs data about percentages of clay, dust, sand and soil bulk density.

The textures in the chart on the left is situated clay that grows from the bottom to the top (*figure 3*).

On the right is the dust which ascends and it in turn from top to bottom.

Soil texture classes include a number of textural subclasses of environmental features analyzed with this program, such as sand, clay, clay-sandy soil and clay (*figure 3*).

The bulk density should record a value of less than 2.65 g/cm^3 (2.65 g /cm^3 density solids meaning).

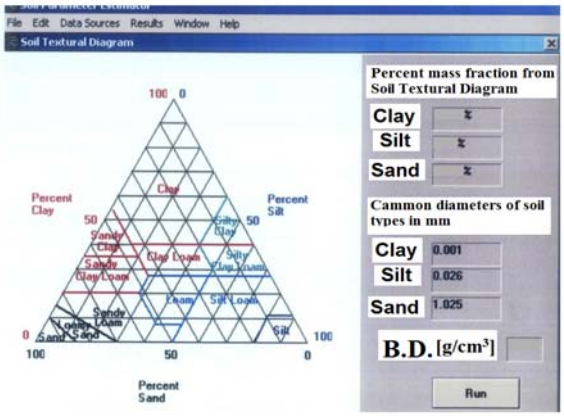

Figure 3 **The interface of Soil Parameter Estimator program**

RESULTS AND DISCUSSIONS

Following the introduction of the program Soil Parameter Estimator (*figure 3*) of apparent densities for each soil samples yielded a total of 8 curves suction that can be used to determine indices hydro, being of particular significance when desired highlighting water content in the soil.

In *table 1* are presents the results obtained after applying the research methods of the physical properties of soils harvested on the four depth from areas studied.

After the program was able to provide us with the 8 suction curves was chosen thresholds suction arranged ordinate axis then was relizat through a line parallel to the abscissa determined the intersection point located on the curve of

suction.

After finding the suction point on the curve was lowered a direct perpendicular to the abscissa and finally determined water content.

In *tables 2* and *3* are presented the water contents obtained from suction curves generated by the Soil Parameter Estimator program.

Table 1

Physical Properties of Soils for Breazu and Dancu

Sample	D.A. [g/cm^3]	Clay [%]	Silt [%]	Sand [%]
B 0-20 cm	1.22	21	29	50
B 20-40 cm	1.45	24	31	45
B 40-60 cm	1.56	26	45	29
B 60-80 cm	1.59	28	64	8
D 0-20 cm	1.08	8	29	63
D 20-40 cm	1.18	19	41	40
D 40-60 cm	1.38	7	34	59
D 60-80 cm	1.43	3	52	45

In *Figure 4* is shown the soil suction curve of B 0-20 cm which on extracted the dates mentioned in *table 2*. For the other curves was proceeded in the same mode.

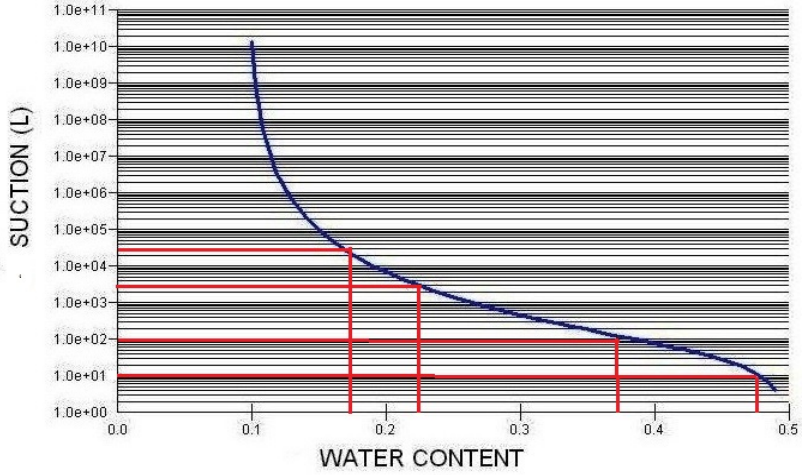

Figure 4 **Suction curves genereted by the Soil Parameter Estimator program for B 0-20 cm and presentation the method of water contents extraction values**

Table 2

Values of water content θ (%) of all suction thresholds for soil of Breazu site - simulated dates

pF (kPa)	θ (%) B 0-20 cm	θ (%) B 20-40 cm	θ (%) B 40-60 cm	θ (%) B 60-80 cm
0	50.11	46	44	36
0.4	49	45	43	35
1	48	44	41	34
1.5	43	41	39.5	32
1.8	40.5	38	38	30.5
2	38.5	36	37	29.5
2.3	31	32	33	25
2.7	28.4	29	31	24
3	26.9	26	28	23
3.4	21.8	23	23.5	20.5
4.2	17	16	19	17.5

Table 3

In the results interpreting will be discussed only a few suction thresholds namely: minimum - 0 pF, minimum-intermediate - 1 pF, medium - pF 2 intermediate medium - pF 3, maximum - pF4.2.

After a simple analysis of data from tables 2 and 3, we see that the minimum threshold of B 0-20 cm soil recorded lower values than the soil sample taken from the same depth of Dancu, this can be argued by densities higher bulk density of B 0-20 cm soil than D 0-20 cm which did nothing to reduce water storage areas.

If the minimum threshold intermediate was observed the same situation but this time with a value increasing with 15% approximately this cause was identical with the minimum threshold.

At pF 2 and pF 3 the things have changed, this time the soil from the Breazu site has managed to earn higher values of θ (%) because if we realize

a correlation of data from Table 1 we notice that the soil of the site's Breazu holds most significant clay, silt and sand content which was unevenly distributed over the entire section studied (0-80 cm) although the values of D.A. were higher as the Dancu soil.

Table 3

Values of water content θ (%) of all suction thresholds for soil of Dancu site - simulated dates

pF (kPa)	θ (%) D 0-20 cm	θ (%) D 20-40 cm	θ (%) D 40-60 cm	θ (%) D 60-80 cm
0	60	51	47	45.2
0.4	54	50	45	44.2
1	48.5	48	42.5	42.4
1.5	34.5	43	34	34.4
1.8	32	41	30	30
2	28.6	39	27.14	28.8
2.3	20	31	20	20.8
2.7	18	28	17.18	17.6
3	17	26	15.6	16.6
3.4	12	21.5	11.25	12
4.2	6	17.5	7.5	6.2

In the case of the minimum threshold of D 20-40 cm the soil recorded a higher content than B 20-40 cm soil sample but in other situations Brezu presented more storage capacity than Dancu soil samples collected from the same depths.

CONCLUSIONS

Making an overall analysis we can mention the following:

Following the introduction of data relating to bulk density have resulted in a a number of 8 curves suction whose data are shown in *table 2 and 3*, which in some cases have ranged from a different depth and location to another.

The program used in this study has managed to provide more precise data that could create a favorable image to retention capacity of soil for each separately type.

A soil with a balanced distribution of the sand, silt and clay contents will ensure a higher content of water that ultimately promote the development and maintenance of conditions vital development both flora and fauna soil - considered one of the most important environmental components.

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