THE SOIL AND ITS APPARENT DENSITY, IN THE EXPERIMENTAL FIELD SITUATED IN NICULA VILLAGE, CLUJ COUNTY

Tamas Dorina, E. Luca, Laura Luca, Adela Hoble
University of Agricultural Sciences and Veterinary Medicine, Faculty of Agriculture, 3-5 Mănăştur street, Cluj-Napoca, România; email: dorinavictoriatamas@gmail.com

Abstract. *The paper contains the results regarding the researches of apparent density of the soil, of the experimental field in Nicula, Cluj county. Apparent density (DA) is a relatively independent characteristic, of which knowledge offers us items of independent physical characterization of the soil. Determination of soil bulk density was achieved by the experimental field samples taken in the natural setting with metal cylinders with a diameter of 5 cm and height of 5.1 cm, resulting in a soil volume of 100 cm^3.*

Keywords: the soil, apparent soil density.

INTRODUCTION

Soil is the main mean of production in agriculture, being irreproductible and unextensible, so he must carefully household, ensuring its maximum fruitfulness and being the basic concern of each country, of all specialists in the field.

The soil is the medium in which the plants are fixed by their root system and also environment where they can obtain water and nutritional elements necessary for growth and development.

Apparent density (DA) is a relatively independent characteristic, of which knowledge offers us items of independent physical characterization of the soil, which can only be deducted in few cases from other features. It is the ratio between the weight of the natural soil settlement (G) and the total volume of the sample considered (VT), including pore volume and is expressed in g/cm3 or t/m3. Bulk density values are between 0.20 g/cm3 and 2.00 g/cm3 depending on soil and layer. Thus, lower values are specific to layers with organic material and amorphous material (such as humus and peat soils which have the lowest volumetric weight) and the highest values for inner layers, with accumulation of mineral colloids, compact and without structure.

MATERIAL AND METHOD

Determination of soil bulk density was achieved by the experimental field samples taken in the natural setting with metal cylinders with a diameter of 5 cm and height of 5.1 cm, resulting in a soil volume of 100 cm^3.

Metal cylinders, used for soil sampling in the natural setting, are made of stainless steel with a thick wall of 0.8 - 1 mm. Their height does not exceed the diameter in order to allow sampling horizons or layers of reduced thickness and as far as possible to avoid compaction. At one end the edges of the cylinder are sharp in order to facilitate their introduction into soil.

Method of operation:

The cylinders aer inserted directly into the soil by tapping with a hammer and over them will be applied a metal ring protection. Thus the cylinder is inserted into the ground until the top edge deepens with 2-4 mm from the surface. The ring is removed, the soil that exceeds the edges at both ends is cleaned. After soil sampling, the cylinder covers are reattached and they are re-weigh. Because there is moisture in the soil from the cylinder, are taken 20 to 30 g of soil and determine moisture by drying in oven.

Then is calculated the absolutely dry weight of soil sample:

The calculation of the results:

$$DA = \frac{G_2 - G_1}{V_t} \ (g/cm^3)$$

where:
G1 - is the mass of empty cylinder (g);
G2 - mass of dry soil cylinder at 1050C (g);
Vt - total soil sample in the cylinder (cm3).

RESULTS AND DISCUSSION

Soil bulk density was calculated with the following mathematical formula:

$$DA\ (g/cm^3) = \frac{M}{Vt},$$

where:
M - soil weight (g);
Vt - soil volume (cm3).

Soil volume included: solid particles and the gaps between the solid particles.

Results obtained from experiments concerning the soil bulk density from experimental solarium are presented in Table 1.

Table 1

***Apparent density values of soil in experimental field* (g/cm^3)**
(Nicula, jud. Cluj)

Depth (cm)	DA / *Repetition*				DA *(average)*
	I	II	III	IV	
0 – 20	1.0	1.21	1.25	1.24	1.22
20 – 40	1.48	1.53	1.54	1.49	1.51
40 – 60	1.63	1.62	1.71	1.65	1.65

The value of bulk density varies from one soil to another and from one layer to another depending on the pedogenetical characteristics or in shallow layers,

following various tillage. Kacinski (1958) proposes the values in Table 2 in order to approximate the bulk density values.

Table 2

Interpretation of soil bulk density values (after Kacinski, 1958)

DA (g/cm^3)	Interpretation
Under 1	The soil is too loose or is rich in organic matter
1.0 – 1.1	Typical values for the layer plowed
1.2	The plowed layer is sunk
1.3 – 1.4	The plowed layer is strongly sunk
1.4 – 1.6	Typical values for the layers in sub-plowed different soils
1.6 – 1.8	Tamping iluvial layers

In the graph below are all average values obtained from density measurements. From the graph we can see that the apparent density increases with depth.

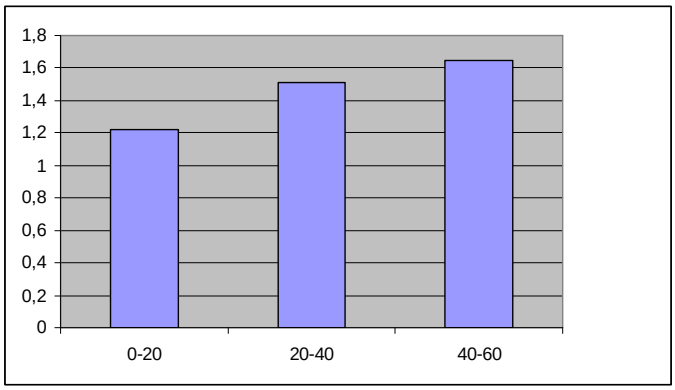

Fig. 1. Medium bulk density in the experimental field

CONCLUSIONS

The importance of knowing the soil bulk density is that the values of this property, serve to assess the composition and the degree of compaction of the soil, and to calculate the porosity and the watering down of the reserves of various specific components of soil (humus, nutrients, soluble salts and water in certain a volume of soil).

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