

# **MORPHOLOGICAL AND PHYSICAL CHARACTERISTICS OF SOIL FROM POLYTUNNELS, AFTER FIVE YEARS OF ORGANIC FERTILIZATION OF SPĂTĂRĂȘTI (SUCEAVA COUNTY)**

## **CARACTERIZARE MORFOLOGICĂ, FIZICĂ ȘI CHIMICĂ A SOLULUI DIN SOLARI, DUPĂ CINCI ANI DE FERTILIZARE ORGANICĂ LA SPĂTĂRĂȘTI (JUDEȚUL SUCEAVA)**

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***Abstract.** The paper presents the organic farming influence on the some morphological and physical soil properties, in polytunnels cultivated with vegetable crops. To know this influence is important in order to take optimum decision on the sustainable exploitation of the soil resources.*

***Rezumat.** În lucrare sunt prezentate modificările unor însușiri morfologice și fizice ale solului din solarii, în condițiile practicării tehnologiilor ecologice de cultivare a plantelor legumicole. Cunoașterea acestor modificări este utilă în vederea stabilirii măsurilor tehnologice de exploatare durabilă a resurselor de sol din sere și solarii.*

### **INTRODUCTION**

The main criteria for the location of the greenhouses are the existence of heating and water sources. The location of greenhouse near the market in order to diminish the transport costs is another main criterion. Due to the compulsory location imposed by the above conditions, many greenhouses were placed on soils considered with a low capability but then through the application of land improvement works satisfactory results have obtained (Canarache, 1995). The high soil moisture, high values of temperature during the year favor the activity of microorganisms in the organic matter decaying. After this process result high quantities of CO<sub>2</sub>. The absence of air currents which assure the change of soil air lead to the necessity of soil air porosity value higher than 10% (v/v) values of which represents the minimum limit of air content for field soils. The use of a high quantity of organic fertilizers (barnyard manure, compost etc.) in the greenhouses has some beneficial effects on soil such as an additional supply of NH<sub>4</sub> -N, greater availability of phosphorous and micronutrients due to the complication, increased moisture retention, improved soil structure, increased pH, buffer capacity and soil organic matter, etc. The main objectives of this paper concern to the identification of the changing of physical and morphological soil properties under influence of organic farming influence on.

## MATERIAL AND METHODS

The Spatarești *polytunnels* has a surface of 1114 m<sup>2</sup>. A subsurface drainage was made in the polytunnels construction as a measure of intercepting the possible infiltration which occurs during irrigation.

Soil profiles were made outside (control variant), and five profiles in the polytunnels. These profiles were morphologically described according to the Methodology of soil survey elaborated by the Research Institute for Soil Science and Agrochemistry, Bucharest (Florea 1987).

After morphological description, undisturbed samples were collected down to, the depth of 90 cm. The collected soil samples were analyzed in the laboratory, in three replicates independent each of horizons. In the laboratory, the bulk density and water content were determined. The humidity of the field soil samples had values between minimum moisture content for watering and field capacity and the corrections for the obtained bulk density values were not made.

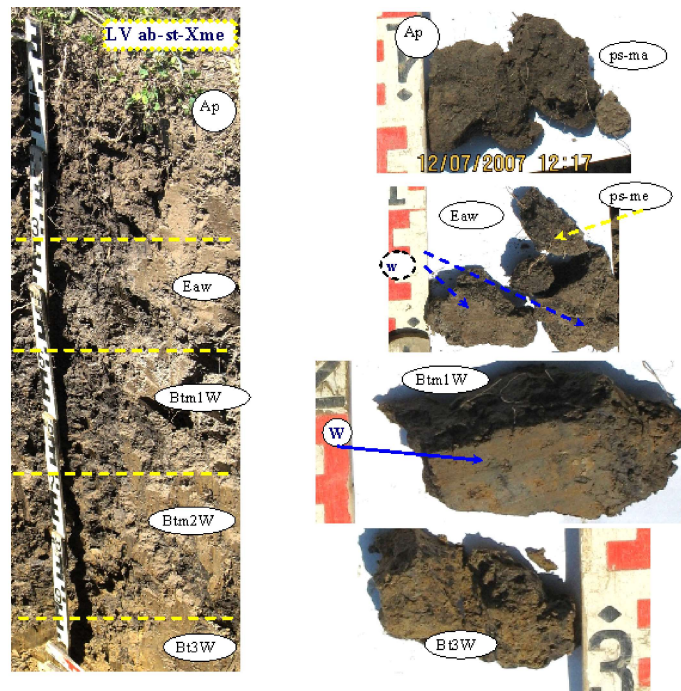
## RESULTS AND DISCUSSION

The *polytunnels* are located on the slight slope land with 390 m altitude; N 47°25'357, E 26°18'676 (determined by GPS)

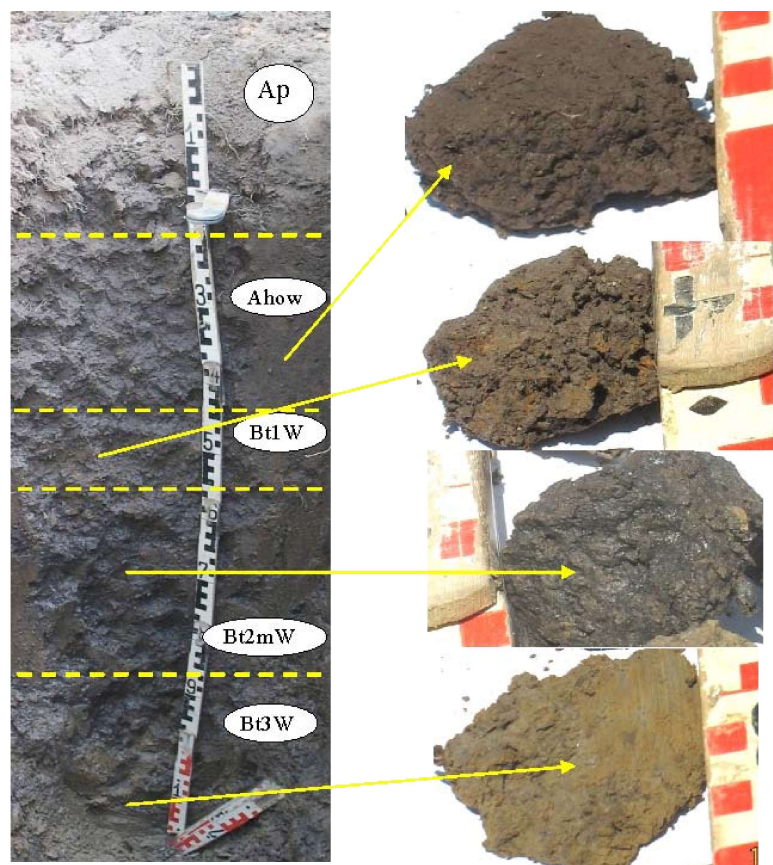
.The parent material are loam deposits. The soil is slight drained. The clima is characterised by, the medium values of rain and temperature of 646 mm and respectively 8.0 °C, the moisture regime being periodic percolative.

The morphological control soil profile description (fig.1) indicated that the soil Luvosol (LV) albic (ab), mezostagnic (st), melanic (Xme): by Romanian Soil Taxonomy (Florea, 2003) or *Stagnic Albic Luvosol* by World Reference Base for Soil Resources, (WRB-SR 1998) or *Typic Glossaqualfs* by USDA Soil Taxonomy (1999). The soil has a medium loam texture in the upper part of the profile (A and E Horizons) and fine texture in the argic B horizon.

After five years of ecological exploitation and large quantity of compost and sawdust application (fig. 2) morphological and physical properties are changed and soil became Antrosol (AT) hortie (ho) argic (ar) mezostagnic (st) melanic (Xme) ): by Romanian Soil Taxonomy (Florea, 2003) or *Hortie Anthrosol* (WRB-SR 1998) or Plagganthrepts by USDA Soil Taxonomy (1999). Some morphological *Hortie Anthrosols* properties are presented in figure 2.

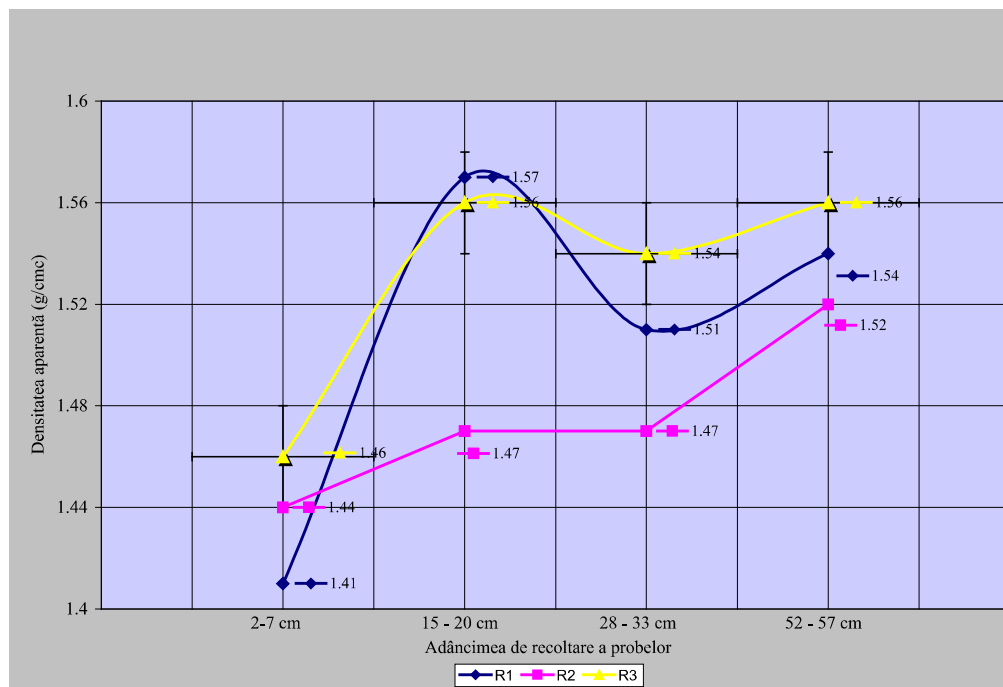


**Fig. 1 - Luvisol (LV) albic (ab), mezostagnic (st), melanic (Xme)**

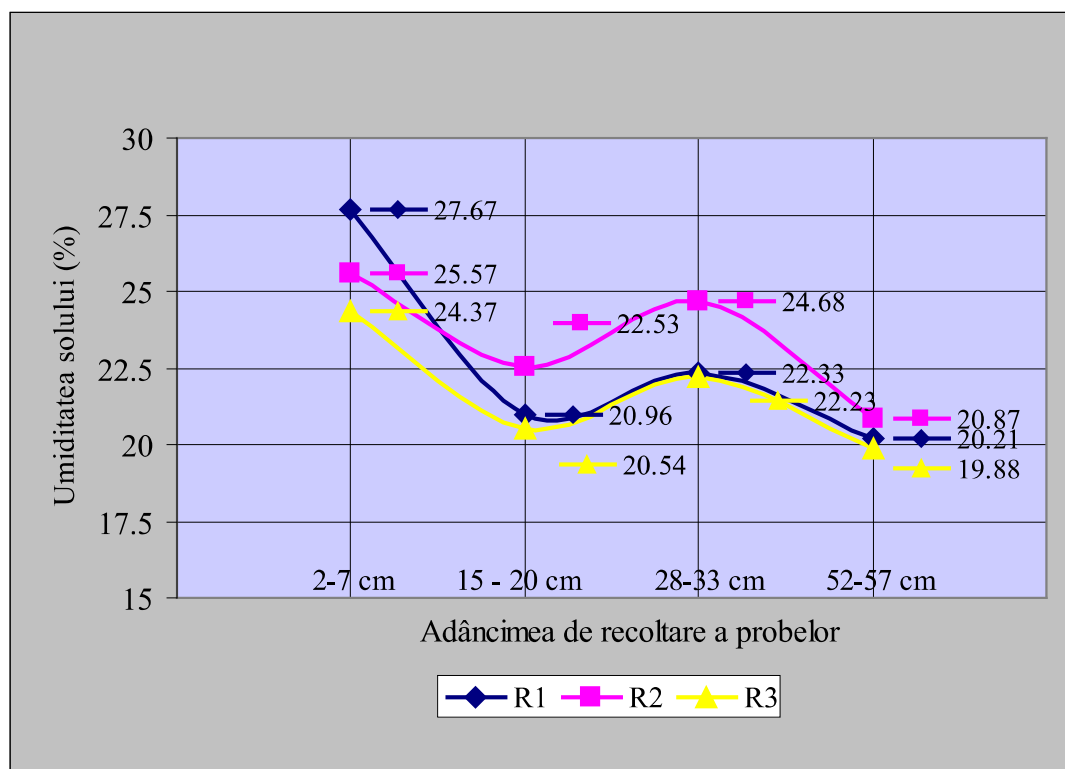


**Fig. 2 - Antrosol (AT) hortico (ho) argic (ar) mezostagnic (st) melanic (Xme)**

The values of bulk density are between 1,41 and 1,56g/cm<sup>3</sup> (fig. 3). The smallest values are registered in the upper part of control soil profile. The high amplitude of bulk density has been determination the large heterogeneity of the soil structure, intense macro fauna activity and plants roots distribution.



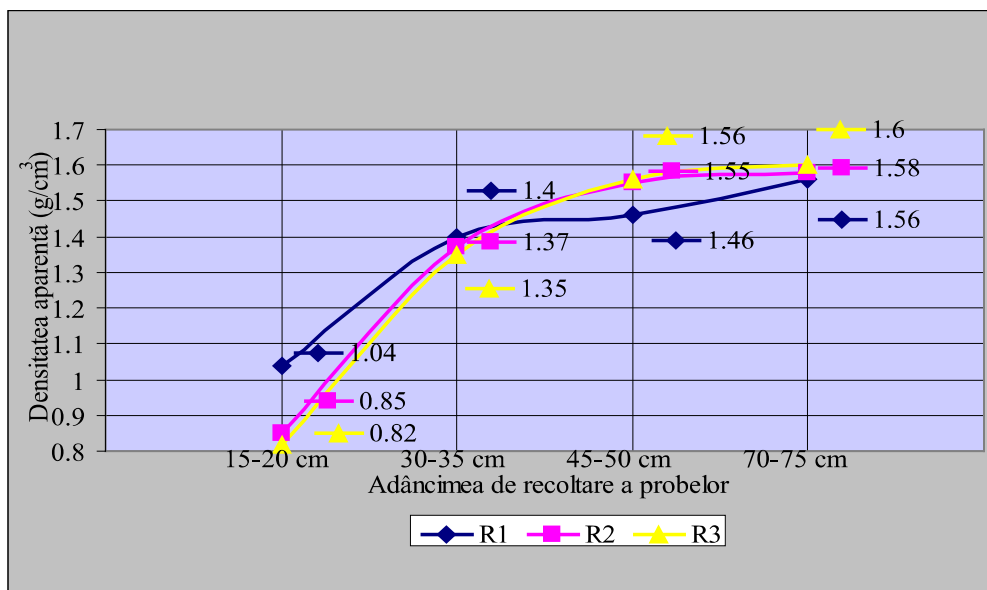
**Fig. 3.** Graphic representation of apparent density values for witness variant



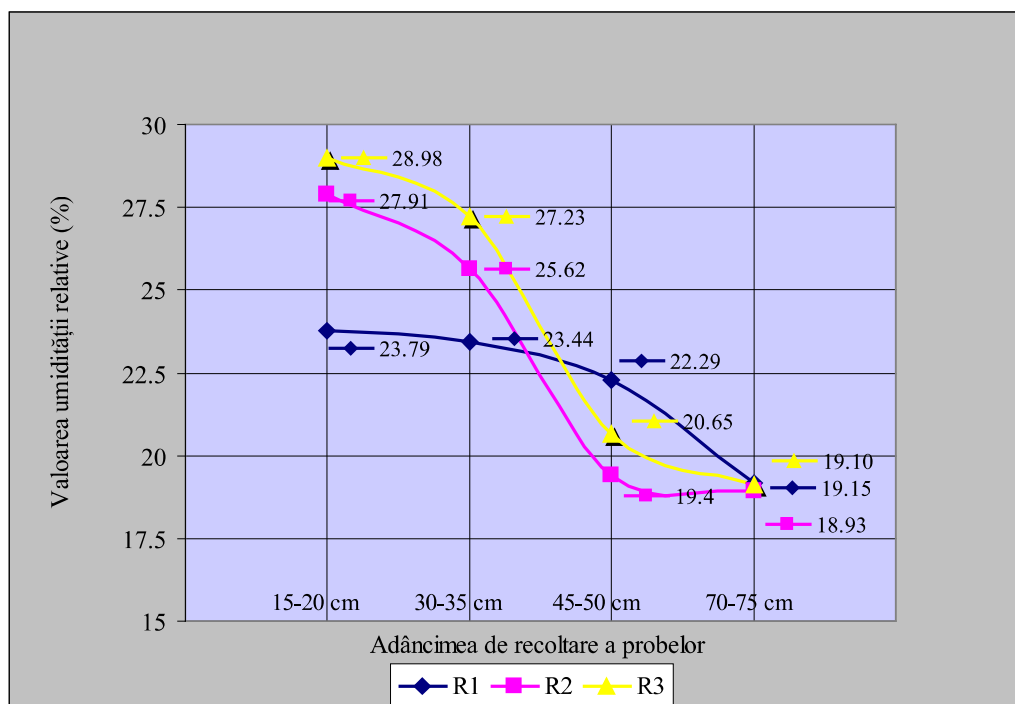
**Fig. 4.** Graphic representation of soil humidity for witness variant

In the A horizon (2-7cm), samples with lowest bulk density values have the highest water content (fig. 4). The highest water retention has the organic mater.

The variation of the soil profile apparent density from polytunnels is the result of technological works that have been made on the studied area. The administration of large doses of annual organic fertilizers (compost and sawdust) associated with repeated land works determined a decrease of apparent density values in the superior part of the soil profile from the polytunnels (fig. 5).



**Fig. 5.** Graphic representation of apparent density values from polytunnel 3



**Fig. 6.** Graphic representation of humidity values in polytunnel

Non uniformity of organic matter distribution in processed Ap horizon is also underlined by a greater amount of water registered at soil samples with a lower apparent density. The intensity of lumbricids activity is reflected by smaller values of apparent density in the middle part of soil profile.

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