

# INFLUENCE OF INTENSIVE FLOWER CULTIVATION ON SOME SOIL RESOURCES CHARACTERISTICS FROM GREENHOUSE VÂNĂTORI NEAMȚ

## INFLUENȚA CULTIVĂRII INTENSIVE A SPECIILOR FLORICOLE ASUPRA UNOR ÎNSUȘIRI ALE RESURSELOR DE SOL DIN SERA VÂNĂTORI NEAMȚ

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**Abstract.** Genesis and evolution of soils in greenhouses are influenced to a greater extent by human intervention than the soils developed in the field. Positive temperature values associated with the absence of freezing and mass air flow winds that favors soil air renewal requires the application of special technologies for plants growing in in order to prevent soil compaction. Intensive exploitation of greenhouse determine the degradation of morphological, physical and chemical characteristics of soil resources, and diminishing of obtained yield and therefore lower profits. A case study started in Vânători-Neamț greenhouse showed that the under ploughed soil layer is moderately compact and prevents plant roots penetration. Water stagnation over the compacted soil horizon requires amelioration works without reversal soil horizons. In this paper are presented the effects of intensive flower cultivation on some soil properties and the execution steps of amelioration work.

**Key words:** compacted soil, greenhouses, salinization, amelioration.

**Rezumat.** Formarea și evoluția solurilor din sere este influențată în măsura mai mare de către intervențiile antropice decât solurile evoluat în câmp deschis. Menținerea temperaturii la valori pozitive și lipsa înghețului asociată cu absența curenților de aer care să favorizeze primenirea aerului din sol impune aplicarea unor tehnologii de cultivare a plantelor în sere și solarii prin care să se evite tasarea și compactarea solului. Exploatarea intensivă a solului are ca efect degradarea însușirilor morfologice, fizice și chimice ale resurselor de sol, diminuarea producției obținute etc. Un studiu de caz inițiat în sera Vânători-Neamț, destinată cultivării intensive a plantelor ornamentale și decorative, a evidențiat că în stratul subarabil solul se prezintă moderat compact, și este restrictiv pentru pătrunderea rădăcinilor de plante. Stagnarea apei deasupra acestui orizont impune realizarea unor lucrări de afânare adâncă fără inversarea orizonturilor pedogenetice. În această lucrare sunt prezentate efectele cultivării intensive a plantelor ornamentale și decorative asupra unor însușiri ale solului și etapele de execuție a lucrărilor de afânare adâncă a solului fără inversarea orizonturilor pedogenetice.

**Cuvinte cheie:** solurile tasate, sere, salinizarea, ameliorarea.

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## INTRODUCTION

Frequently greenhouses are located near sources of heat and water. Another important criterion taken into account in determining the location of a greenhouse is to be located at a short distance from the center of outlet in order to reduce the costs of transport. Under these circumstances suitability of soil resources for horticultural plants to be grown is often ignored. However, after the application of ameliorative works satisfactory results are obtained a given period.

The frequent use of a high quantity of organic fertilizers (barnyard manure, compost etc.) in the greenhouses has some positive effects on soil such as an additional supply of nitrogen, greater availability of phosphorous and micronutrients due to the complexation, increased moisture retention, improved soil structure, increased pH, buffer capacity and soil organic matter, etc.

After intense mineralization of organic matter, due to favorable moisture and temperature condition for activity of microorganism, a high amount of organic acids results. The soluble organic acids are leached from the surface to lower soil horizons after a combination of these acids with calcium cations new compounds result. The precipitation of these compounds facilitates the building up of an impermeable horizon for air and water and the penetration of roots as well as sandstone (Davidescu, 1992).

The impermeable horizon has been identified both in acid soils (Planosol) and neutral soils (Hortic Anthrosols) from greenhouses (Conea, 1976, Filipov, 2001).

The new greenhouses soil properties may not be related to lithology and another initial soil formation factors. The arrangement technologies of protected areas and the exploitation methods require, both the modification of pedogeochemical characteristics of initial soils (over which are set the greenhouses and solariums), often to the almost complete blurring of their characteristics, and the continuous changes of pedogeochemical properties during of these soils exploitation (Mănescu, 1984; Davidescu and Davidescu, 1992; Voican and Lăcătuș, 1998).

The main objective of this paper is to present a method for improving soils with slight permeable horizons with a low humus located at small depth.

## MATERIAL AND METHOD

Investigations concern to the influence of intensive flower cultivation on some soil resources characteristics were conducted on the greenhouse Vânători –Neamț.

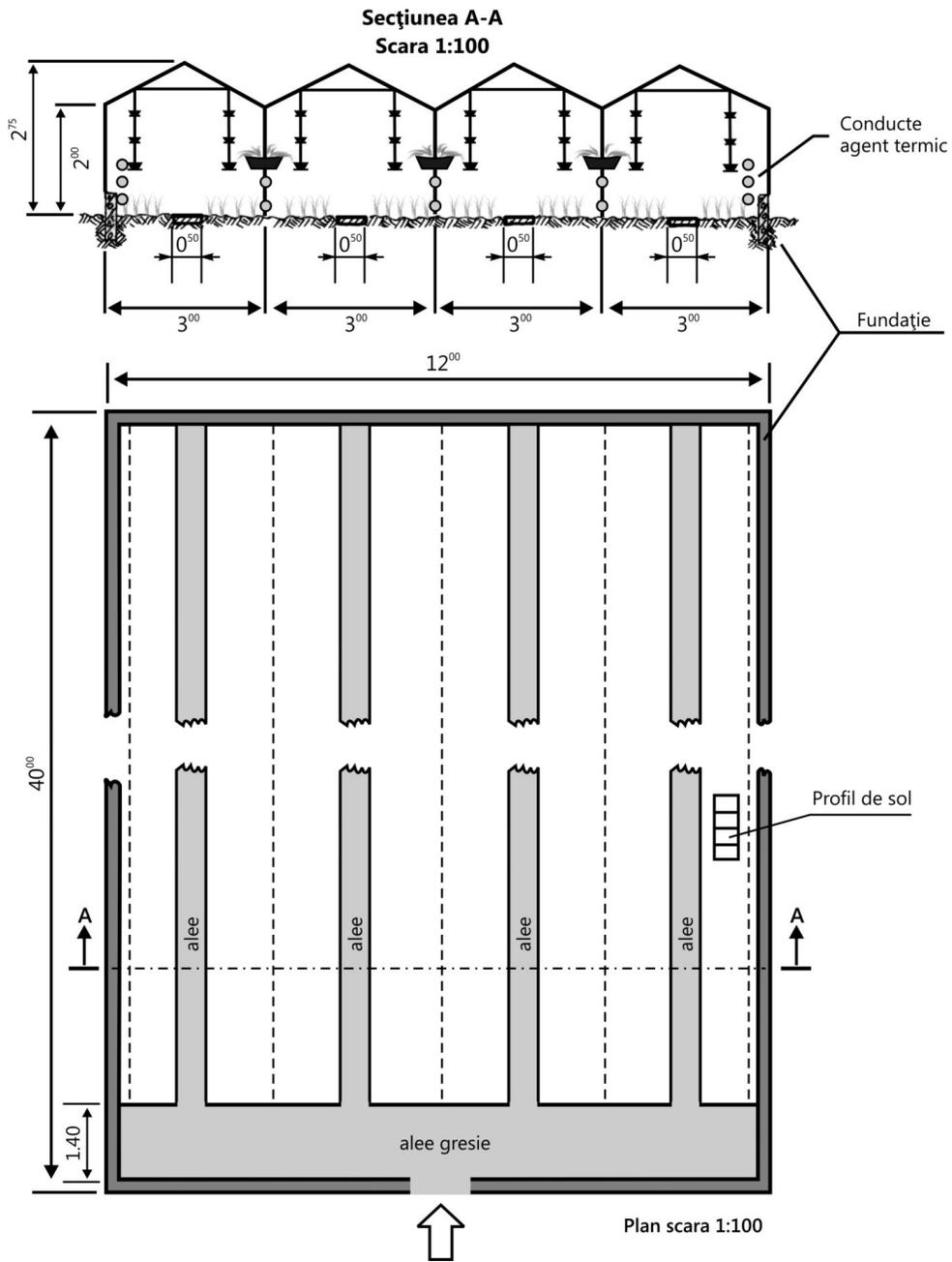
Some soil profiles were made inside of greenhouse. These profiles were morphologically described according to the Methodology of soil survey elaborated by the Research Institute for Soil Science and Agrochemistry, Bucharest (Florea 1987; 2003,2012; Munteanu, 2009).

After morphological description, undisturbed samples from every soil horizon were collected. In the lab, the bulk density were determined.

Disturbed samples from the soil profiles were also taken. These samples were used to determine the total soil organic matter by potassium dichromate method (Walkley-Black), total nitrogen content by Kjeldahl method, pH by potentiometric method,

size particle by Kacinski method, soluble salts by conductometric method. The chemical analyses in three replicates for each depth were independently performed.

To underline the effect of intensive flower cultivation on some soil resources characteristics were chosen only a representative soil profile (fig.1).

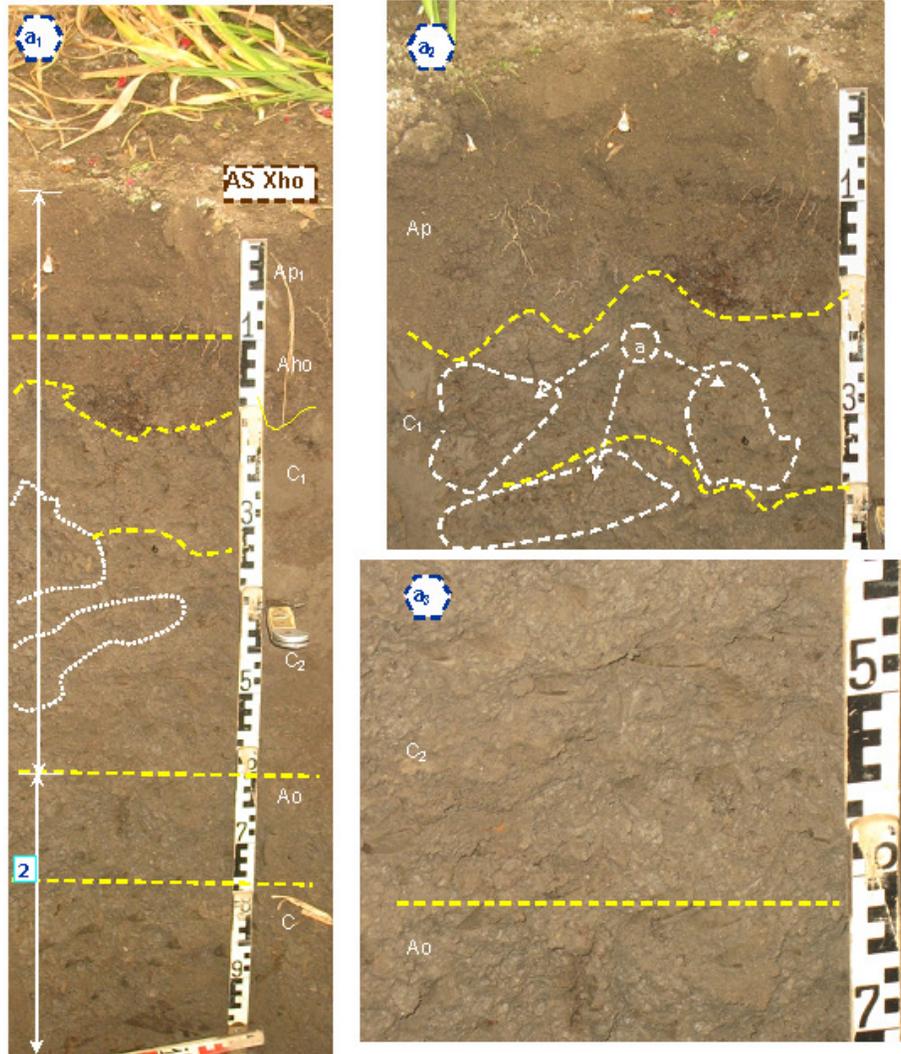


**Fig. 1** - Greenhouse for growing of ornamental and decorative plants from Vânători Neamț and location of representative soil profile

## RESULTS AND DISCUSSIONS

After morphological description the soil is diagnosed as hipohortic Aluviosol. Soil consists of ploughed horizon (Ap), hipohortic horizon (aho) with high content of heterogeneous organic matter and C horizon (fig. 2). The presence of frequent earthworm channels suggest a great biological activity. The absence of earthworm organism on the soil profile highlight a worsening of biological activity, the presence of earthworm channels being only a remanent effect.

The soil texture is loam on the upper part of soil profile and sandy loam in the subjacent ploughed horizon.



**Fig. 2** - Hipohortic (Xho) Aluviosolul (AS) with earthworm channels (a<sub>1</sub>), developed on the entic aluviosol (2). The earthworm channels- remanent effect of great biological activity.

Under hipohortic horizon (Aho) soil became moderately compact and favors temporary water stagnation. The presence of rot fibrous organic mater suggests that microbiological soil activity is low. The compaction of c horizon is evidenced by the medium bulk density value of 1,54 g/cm<sup>3</sup> (table 1). The high value of carbon/nitrogen another indicator of low microorganisms' activity.

Table 1

Some physical and chemical propertie of hipohortic Aluviosol

Depth (cm)	Horizon	Texture	pH	BD g/cm <sup>3</sup>	OM %	CEC me/100g	C/N
0-10	Ap <sub>1</sub>	*L	6,2	1,31	6,37	25,2	9,3
10 -15 (18)	Aho	L	6,7	1,45	11,65	29,1	16,8
15 (18) -30 36	C <sub>1</sub>	SL	6,9	1,54	4,2	22,37	12,4

BD-Bulk density (g/cm<sup>3</sup>); OM Organic matter (%); CEC – Cation exchange capacity; L-Loamy texture; SL – Sandy loam texture; Ap – ploughed horizon; Aho-hortic horizon

After following the intensive cultivation of ornamental and decorative plants a slight soil salinization is evidenced. The highest content of soluble salts is evidenced near the heat register

Table 1

Contents of the souble salts of hipohortic Aluviosol

Depth (cm)	Horizon	Soluble salts %		
		RP	BR	HR
0-10	Ap <sub>1</sub>	0,,147	0,178	0,259
10 -15 (18)	Aho	0,127	0,134	0,143
15 (18) -30 36	C <sub>1</sub>	0,152	0,193	0,187

RP-plants rows;BR – between rows; HR Heat register

The main improving soils with slight permeable horizons with a low humus located at small depth. The amelioration of the the compacted soil horizon and the improvement of internal drainage is possible by deep loosening works without reversal soil horizons (fig.3)

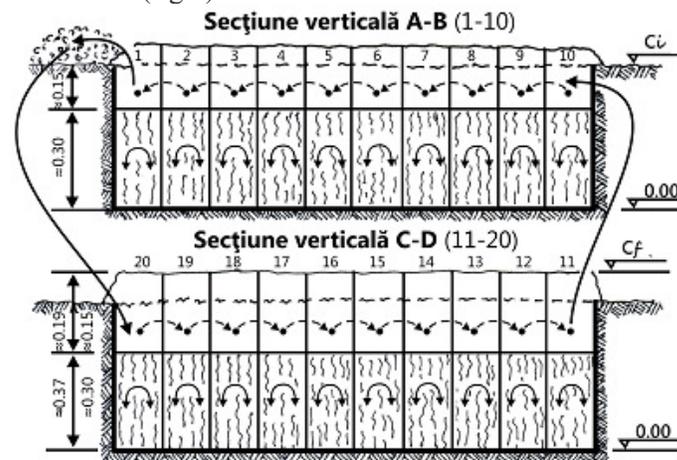


Fig. 3 - Steps of amelioration copaction soil works without reversal soil horizon

## CONCLUSIONS

1. The presence of frequent earthworm channels suggests a great biological activity. The absence of earthworm organism on the soil profile highlights a worsening of biological activity, the presence of earthworm channels being only a remanent effect.

2. After following the intensive cultivation of ornamental and decorative plants a slight soil salinization is evidenced. The highest content of soluble salts is evidenced near the heat register.

3. The amelioration of the compacted soil horizon and the improvement of internal drainage is possible by deep loosening works without reversal soil horizons.

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