CRITERIA FOR IDENTIFYING AND DRAWING ON PLANS SOIL HETEROGENEITY FROM TERRACED PLATFORMS

CRITERII DE IDENTIFICARE ŞI REDARE PE PLANURI A HETEROGENITĂȚII SOLURILOR DE PE PLATFORMELE TERASELOR

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Abstract. *The conjugated effect of complex improvement works for terraces and of their subsequent exploitation on the heterogeneity of soil units cannot be pointed out on plans made at a lower scale than 1:5000 or even 1:2000. The representation of soil units on higher plans than 1:2000 is difficult and needs additional efforts, especially in laboratory. One of the possible solutions in this case is drawing maps with soil units at a lower scale, and soil units with areas of a few square meters , spread preferentially in certain areas (for instance, upstream the terraced platform) should be represented on plans drawn at higher than 1:200 scale. The paper presents some considerations on choosing the scale for making up plans, in order to show the heterogeneity of soils from terraced platforms.*

Rezumat. *Efectul conjugat al lucrărilor ameliorative complexe de amenajare a teraselor şi cel al exploatării ulterioare a acestora asupra heterogenității unităților de sol nu poate fi evedențiată pe planuri întocmite la scara mai mică de 1:5000 sau chiar 1:2000. Reprezentarea unităților de sol pe planuri mai mari de 1:2000 este greoaie şi necesită eforturi suplimentare mai ales în faza de laborator. Una dintre soluții posibile în acest caz ar fi întocmirea hărților cu unități de sol la scara mai mică iar unitățile de sol cu areale de câțiva metri pătrati, răspândite preferențial în anumite zone (ex. în partea de amonte a platformei terasate) să fie reprezentate exemplificativ pe planuri redactate la scări mai mari de 1:200. În această lucrare se prezintă unele considerații privind alegerea scării pentru întocmirea planurilor în vederea redării heterogenității solurilor de pe platformele teraselor*

INTRODUCTION

Making a soil study (text of detailed characterization of environment, soil units and interpretation of data obtained in the field and laboratory, and corresponding mapping material) requires characterizing and systematizing of base soil data, interpreting and estimating these data for different purposes (Florea, 1987).

According to the studies from specialty literature and Internet, CD-ROM, correlated to our own observations on the effect of settling on soil characteristics, we may confirm the increase in soil heterogeneity after the arrangement works and even after using soil for agriculture or gardening on terraced platforms.

According to the methodology of carrying out soil studies (ICPA, vol.I-III 1987, Florea 1964, Andreiaşi 1999), in a soil and field mapping unit, other soil and field areas may be included until 10-15% of the area. Soil studies necessary to the projects of slope arrangements or setting up vine and fruit tree plantations are done at the scale of 1:5000-1:2000. Because the minimum rational area of soil units, represented cartographically at the above-mentioned scales, is of $1cm^2$, the size of other soil areas included in soil or field cartographic units is of $60m^2$ (on plans with the scale of 1:2000) and respectively, 375 m^2 (on plans with the scale of 1:5000). According to Florea (1964), the minimum size of soil lengthened units is $0.2cm^2$ or 5mm at diameter in case of circular units. The rational size of soil units represented on plans at a larger scale than 1:5000 is of $1cm^2$. The area of $1cm^2$ on plans made at the scale of 1:500, 1:1000, 1: 2000 şi 1:5000 corresponds to 25 m^2, 100 m^2, 400 $m^2$and, respectively, $2500m^2$. Frequently, the great soil heterogeneity on terraced platforms cannot be presented cartographically at scale of 1:5000 and even at scale of 1:2000.

The paper presents some considerations on choosing the scale for making up plans, in order to show the heterogeneity of soils from terraced platforms.

MATERIALS AND METHODS

The conjugated effect of complex improvement works for terraces and of their subsequent exploitation on the heterogeneity of soil units cannot be pointed out on plans made at a lower scale than 1:5000 or even 1:2000. The representation of soil units on higher plans than 1:2000 is difficult and needs additional efforts, especially in laboratory. One of the possible solutions in this case is drawing maps with soil units at a lower scale, and soil units with areas of a few square meters , spread preferentially in certain areas (for instance, upstream the terraced platform) should be represented on plans drawn at higher than 1:2000 scale. The determination of scale at which plans are drawn will be done according to shape and size of areas occupied by soil units within terraced platforms. The heterogeneity of some specific features of soils is shown both by the uneven development of cultivated plants and by some bio-indicator plants. The base elements in defining soil units are the morphological characteristics of main soil profiles, pointed out in the field, and completed with laboratory chemical analyses. The morphological description of soil profile in the field, in tight connection with the environment factors, and human action, is done according to the methodology of elaborating soil studies (I.C.P.A-1987).

RESULTS AND DISCUSSIONS

Soil mapping of terrace-arranged fields was made by morphological, physical and chemical characterization of main soil profiles placed downstream, in the middle side and upstream the terraced platforms. Most of the times, the characterization of these soil profiles was not enough for showing soil heterogeneity on arranged terraces. In these cases, the field mapping was required-a key to a larger scale than the one of the map, on which the results of research were shown.

Choosing the key-fields must be done so that they include the areas of all soil units. Therefore, the detailed mapping was necessary, with high denseness of profiles, placed in such a way that all soil and genetic conditions should be characterized correspondingly. Determination of the sites for profile placing, in order to characterize the complexity of soil cover on terraced platforms could be done according to preliminary remarks shown in scheme 1. Thus, the uneven character of vinestock or fruit tree development could be determined by certain soil characteristics. Morphological, physical and chemical characterization of soil profiles from areas where the differentiate vinestock or fruit tree development was found, and interpretation of obtained data in field and laboratory could elucidate the causes of soil nature, which have limited their development.

Additional information concerning the heterogeneity of certain soil characteristics could be obtained by inventorying the species from field flora, which develops in studied areas. The presence on terraced platforms, on which vine or fruit tree plantations were set up, of weeds with different requirements towards soil, has reflected the heterogeneity of the edaphic environment.

We think that in most of the above-mentioned cases, the cause of the presence of different weed associations was the edaphic environment, as soil was cultivated with the same plant species or variety for a longer period, and the same technology was applied on the entire terraced platform.

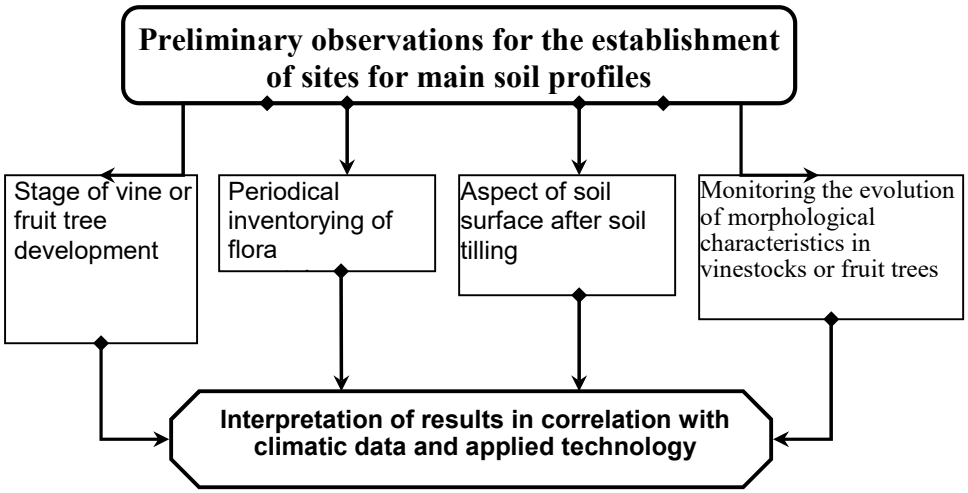

Fig. 1 – Informative scheme for determining the sites of profile placement , in order to characterize the complexity of the edaphic environment on terraced platforms

The differentiated development of vinestocks or fruit trees during the vegetation season, estimated according to the vigour of stocks and leaf color has indicated a possible modification in certain soil characteristics, requiring either sampling or soil profiles. The more accurate determination of leaf color can be done by using color samples from "*Munsell color charts for plant tissues*". The color samples from this atlas can be defined according to the parameters of the three variables: nuance, value and color.

The uneven color aspect of the area of freshly tilled soils is another indicator of the uneven character of soils from the terraced platforms. Placing the soil profiles for special soil studies will be done in all the areas where the modification of light, saturation and nuance of color is found out. The color of soil area in dry and wet condition will be defined according to color samples from "Munsell Atlas".

The modification of the field slope and achievement of terraces represent another cause of soil heterogeneity. Knowing the mode of making terraces is useful for establishing the differentiated study on platforms of upstream-arranged terraces, in the middle side or upstream the slope.

Choosing the representative areas for exemplifying will be done according to the limitative factor of the development of cultivated vegetation (depth at which calcium carbonate issued, $CaCO_3$ content, intensity of soil salinization and degree of salinization and/or sodium percentage, degree of soil stripping, etc.)

In order to establish the scale for presenting the key-fields, where soil units with lower area are also included, it is necessary to pass through the following stages:

- Delimitation in the field and determination of size and shape of soil units on the terraced platform;
- Choosing the scale of plan drawing according to size and shape of soil units, by using data from table 1.

Table 1

Informative sizes for presenting soil units from terraced platforms and determination of scales for plans drawing

Minimum area of soil unit		**Minimum width of lengthened soil units**		**Maximum area of other soil units (m^2)**	**Scale of the plan**
In the field	**On map**	**In the field**	**On plan**		
4 m^2	1 cm^2	1 m	0.5 cm	0.6	1:200
25 m^2	1 cm^2	2.5 m	0.5 cm	3.75 m^2	1:500
100 m^2	1 cm^2	5 m	0.5 cm	15 m^2	1:1000
400 m^2	1 cm^2	10 m	0.5 cm	60 m^2	1:2000
2500 m^2	1 cm^2	25 m	0.5 cm	375 m^2	1:5000

Soil heterogeneity on the platforms of terraces is growing after clearing of vine or fruit tree plantations and soil preparation for setting up new plantations. After clearing, by root stump removal by hand or mechanized, some micro-depressions appeared, which were partially filled with soil mixture from soil-genetic horizons, crossed by vine or fruit tree roots. The leveling works of terraced platforms have resulted in the even character of soil layer at surface (0-30 cm), but soil heterogeneity from subjacent layers was maintained. We think that the drawing on plan of soil heterogeneity was not necessary because of clearing works, but they should be mentioned in the text of the soil study. The knowledge of soil heterogeneity on the terraced platforms was useful in order to establish the technology of plantation setting up (choosing the planting material, establishing the planting alignments of vine or fruit trees).

CONCLUSIONS

The characterization of soil profiles, placed downstream, in the middle side and upstream of terraced platforms, is not enough for showing the soil heterogeneity on arranged terraces. In these cases, the mapping of key –fields is required at a greater scale than the scale of the map, on which are the results of research.

The establishment of sites for profile placing, in order to characterize the complexity of soil cover on the terraced platforms can be done according to preliminary observations on the uneven character of vinestocks or fruit tree logs, additional information on inventorying the species from weed flora, which develops in the studied areas.

The presence on terraced platforms, on which vine or fruit tree plantations were set up, of weed species with different requirements toward soil, shows the heterogeneity of the edaphic environment. In most of studied cases, the cause of the presence of different weed associations is the edaphic environment, because soil is cultivated with the same plant species or variety for a longer period, and the same technology is used on the entire terraced platform.

In order to establish the scale for showing the key-fields, in which soil units with lower area are included, it is necessary to pass through the following stages: field delimitation and establishing size and shape of soil units from terraced platforms; choosing the scale of plan drawing, according to size and shape of soil units, by using data from table 1.

REFERENCES

1. **Andreiaşi N., Mihalache M., 1999** – *Soils from Romania* Ed.EX PONTO, Constanța.
2. **Florea N., 1964** – *Soil study in the field,* Ed.Ştiințifică, Bucharest
3. **Lixandru Gh., 2006** – *Integrated fertilization systems in agriculture* Ed. PIM, Iaşi.
4. ***** *Methodology of elaborating soil studies*, 1987-vol.I şi II. I.C.P.A. Bucharest