Physical Characteristics of Terraces Agricultural Soils in Al-bahah District

اعداد

أ / ابتسام بنت سالم الغامدى

Abstract

Little attention has been paid into agricultural terrace soil properties. For this reason the current research aimed to study the physical characteristics of such soils as an initial step in obtaining a broader understanding of their properties. This is important because these the sites terraces are closely associated with human settlement in this mountain zone. During the course of the research several important findings were made may be the important finding were made may be that the highest percentage of soil were silts (loess), sand and clay are different from valley to valley. This may be result of local geology. Rocks in the Ghazeer valley are schist and those in the Bani Saeed valley are very weathered granites relating to former Tertiary climates and plate movements of the Peninsula when it was in equator and terraces silts are probably originally blown in from Africa and the Rub' al Khali and on slopes have been transferred by flood water into terraces and it called secondary deposits

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Introduction

The soil of agricultural terraces is of great importance to the environment and inhabitants of the slopes and valleys of the Sarawat Mountains. It was one of the main reasons for human settlement, as it provided them with agricultural crops in summer and winter, taking advantage of the winter rain that fall as a result of hurricanes coming from the Mediterranean Sea and seasonal rain in summer coming from Africa to the monsoon winds and as a result of rain and dust transported from the African continent and from the Empty Quarter. The soil of the agricultural terraces was accumulated behind the supporting wall, whether from the dust falling on the terrace basin or the transfer of dust that was accumulated on the slopes of the mountains to the terrace by rainwater. The soil in this case is considered secondary sediment, and it has well-known local names in the southwest of the Kingdom of Saudi Arabia. In the southwest region of the Kingdom of Saudi Arabia, it is called (Al-Kadra), and I think what is meant by this name is that it turbids the water if it is mixed with it. Also it is called (Madar), and it was widely used in building houses as it is known in

the Asir region. Also it was used to make the roofs of wooden houses.

Aims of the Study

This study aims to achieve the following:

1- Identifying the physical characteristics of the agricultural terraces soil in the Al-Baha region, and does it belong to the Al-Louis soil, as Saad (2003) mentioned? Which is one of the most fertile soils for cultivation in the world, as mentioned by (Calvin, 1906; Chesworth, 1982; Wooldridge and Linton, 1993), as it was a major reason for human settlement on the slopes of the Sarawat Mountains.

2- Knowing the similarities and differences between two different valleys in the geological structure, which are Ghazir valley and Bani Said valley, and whether the different types of rocks affect the natural properties of the soil or not?

the importance of studying:

The importance of the study lies in providing information of scientific value that leads to identifying the importance of the terraced soil in the ecosystem of the slopes and valleys of the Sarawat Mountains. In this study, the great importance of the terraced soil, which accumulated behind the supporting wall of the agricultural terraces over thousands of years, was reached. It is the

main reason for creating an optimal environment for various plants. and this study is important in providing information of scientific value that leads to identifying the behavior of these valleys and their disposal of surface running water, in reducing the risk of torrential floods. Agricultural terraces are dams that reduce the risk of floods. The importance of this study also lies in its expected scientific contribution to identifying the physical characteristics of the soil of agricultural terraces in the Al-Baha region because of its great importance to human activities such as its exploitation for agriculture, as it is a fertile agricultural soil consisting mostly of silt (Saada 2003). As well as its great importance for the environmental components in this region. The characteristics of the agricultural terraces soil, which is mostly silt, is a major reason for the presence of springs and wells in facilitating the infiltration of water to their depths and staying in them for a long time, as well as aeration and the ease of deepening the roots of plants in it (Calvin, 1906; Chesworth, 1982;Wooldridge and Linton, 1993) The soil of agricultural terraces is still unknown despite its importance in human settlement on the slopes of the Sarawat Mountains, as well as its natural properties that allow water intrusion, which leads to the supplying springs and wells with water.

Study hypotheses:

1- Knowing the composition of the soil of agricultural terraces, is it silt, clay, or sand, or is it a mixture of the above and what is the proportion of each of them?

2- Are the characteristics of the agricultural terraces soil in the same valley similar or different?

3- Do the physical characteristics differ according to the geological formation of the valley, or are they secondary sediments that were transmitted by the wind from the Empty Quarter, or from Africa and were swept away to the agricultural terraces by rain, as Saada (2003) mentioned or is it local soil?

Terminology of study:

1- Soil

A thin layer on the face of the earth consisting of two compounds, one organic (humus) and the other inorganic (minerals), and thus it is a series of natural and chemical components that have a great effectiveness on plant growth. "Yahya al-Du'an (1421)".

2- Sand

Sedimentary sand grains with a diameter ranging between .09 mm - 3 mm. "Yahya al-Du'an (1421)".

3- Clay

Small sedimentary grains with a diameter of up to .000 mm, which are the smallest soil grains. Yahya al-Du'an (1421)".

4- Silt

It is a clastic sediment resulting from the carving of rivers in the modern era, which are found in the flood plains and flood fans, and it is highly fertile and suitable for agriculture. Yahya al-Du'an (1421)".

5- Soil texture

It embodies the natural properties of rocks, which are related to the size, shape, and arrangement of the mineral grains contained in these rocks, such as coarse and fine grains. Yahya al-Du'an (1421)".

6- Agricultural Terraces

A group of terraces, which were cut in the mountain slopes and necessary in order to provide agricultural land and reduce soil erosion in these areas with steep slopes. Yahya al-Du'an (1421)".

7- Loess

A global term given to a type of agriculturally fertile soil that is transmitted by air or water, and most of it consists of silt. Scientists did not agree on the source of this type of soil. (Saada 2003)

Results of the study

The results of this study are summarized in the following points:

- Most of the soil of agricultural terraces consists of silt, which was transmitted by the western wind from the African continent and the eastern wind from the Empty Quarter and not only from the Empty Quarter. The student collected two samples of dust coming from the African continent from the roofs of two houses, one from the city of Al-Baha and the other in the city of Baljurshi in the year 300AD. After analyzing it with the rest of the samples, the result was that this dust consists mostly of silt and a little bit of clay.
- The results of the statistical analysis of the physical characteristics of the soil of agricultural terraces showed that they differ from one valley to another according to the geological composition of the valley. The percentage of sand in Wadi Bani Said is greater than the percentage of sand in Wadi Ghazir, and the average size of sediment particles in Wadi Bani Said decreases as we head down the valley, while the average size of sediment particles in Wadi Ghazir is less than that of Wadi Bani Said, because Wadi Bani Said consists of granite rocks that have been subjected to chemical

weathering, while Wadi Ghazir rocks consist of metamorphic rocks (schist). It is known that chemical weathering of granite rocks leads to the decomposition of mica and feldspar, while quartz is not affected by chemical weathering due to its hardness. It remains without decomposition.

- The amount of silt and clay in the agricultural terraces in both valleys increases from the top of the valley to its bottom, and it may be due to the flooding of the terraces during the time of heavy rain.
- The study showed that the soil of agricultural terraces is mostly alluvial sediments deposited by air or transferred from the slopes of the mountains to the terraces by hydrological processes. In Wadi Bani Said, we find that the sediments are mixed with sand resulting from the chemical weathering of granite rocks. As a result of the rain and the flooding of the terraces, this leads to the transfer of fine silt and mud from the upper terraces in the valley to the lower terraces.
- Agricultural terraces are water traps with the presence of the basin at the top of each terrace and the physical characteristics of the soil of the agricultural terraces, which mostly consists of silt with optimal porosity for water

infiltration into the interior of the terrace, as well as for soil retention of a good percentage of moisture for plant growth, while the rest seeps to be springs and provide wells with water.