

Differences between non- agricultural and agricultural soil properties in Al-Madinah Al-Munawwarah

This Research project is a collaboration between two students

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Secondary School Forty-Eight (48)
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The Kingdom of Saudi Arabia

2017

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Abstract

Soil is a natural media and it is a relatively complex and non-fixed system. It changes depending on the many factors some of which are natural and others due to human activities. Agricultural product productivities depend on it is fertility and suitability to a crop plant. Statistics show that one third of the population of our planet is suffering food shortages. This problem was recorded in developing countries, and it was estimated that 10 thousand people die every day as a result to food shortages. In this current study differences between agricultural and non-agricultural soil in Al-Madinah Al-Munawwarah was studied. Different soil properties were measured and compared; pH, nitrogen and carbonates content and also its conductivity. Results showed that there were differences between the two types of soil in these properties. Soil pH and conductivity were higher in non-agricultural soil to that measured in the agricultural soil. However, the proportion content of both nitrogen and carbonates were higher in the agricultural land under study. Farmers in general prefer the suitable land for their crops and mostly is the neutral type of soil. It is important to look for ways to protect agricultural land in Al- Madinah Al-Munawwarah and launch different ways to reacclimatize poor soil. In addition, study several factors which may lead to deteriorate agricultural soil such salinity and contaminations. Al- Madinah Al-Munawwarah soil historically is suitable for planting date palm trees and therefore it is important to keep this important fruit crop thriving in this area.

Introduction

Soil is the media for plants. Soil provides water and nutrients to plants and allows them to root. Therefore, it is important to study soil properties and its potential to support plant growth. Key soil properties such as its texture, pH, organic matters and fertility should be investigated and directly may affect plant production and therefore, can affect our life. However, the need of each crop plant could vary form one species to another. The Kingdom of Saudi Arabia area of about 2.25 million square kilometers (UNDP, 2010) with population of about 32.6 million (FAO, 2010). It covers about 80% of the Arabian Peninsula (Al-Hamzi, 1997).

The Kingdom of Saudi Arabia weather is considered as harsh with hot and dry and any changes in the climate may have direct effect on water resources and of course on agriculture. These kinds of changes may also affect soil properties. In this study properties of agricultural soil and non- agricultural were compared on some of its characters in Al- Madinah Al-Munawwarah.

Research Questions

Are there differences between agricultural and non-agricultural land in Al- Madinah Al-Munawwarah?

Four soil properties were compared pH, conductivity, nitrogen and carbonate content on both agricultural and non-agricultural soil in Al- Madinah Al-Munawwarah.

Hypothesis

There are differences between agricultural and non-agricultural soil in Al-Madinah Al-Munawwarah in pH, conductivity, nitrogen and carbonate content

Material and methods

A team of four students were formed to investigate soil contents in two different of soil, agricultural and non-agricultural. The methods and steps followed as it was described by GLOBE protocols. All equipments used were also described in GLOBE protocles (Figure 1)



Figure 1. Equipments and tools used in the study.

Soil samples were collected from the sites (Figure 2). Three samples of each type of soil were collected dated between 24th of January 2017 and 14th of February 2017. Students collected three samples from agricultural soil and another three from non-agricultural soil in Al-Madinah Al-Munawwarah (Figure 2) during the period 24 / January / 2017 to 14 / February / 2017. The agricultural soil was collected from farms in the same area as an example see Figure 2, which an image for one of the farms. The non-agricultural samples were collected from the school yard. Sample preparations for analysis were carried out in the school laboratories with the help of the laboratory assistance. Samples were divided into three sub samples and then different parameters were carried out after sample preparations. Devices used as advised by GLOBE protocols for pH, conductivity, and measuring carbonate and nitrogen soil content. Data mean was calculated and entered in Excel and then blotted (Figure 3).



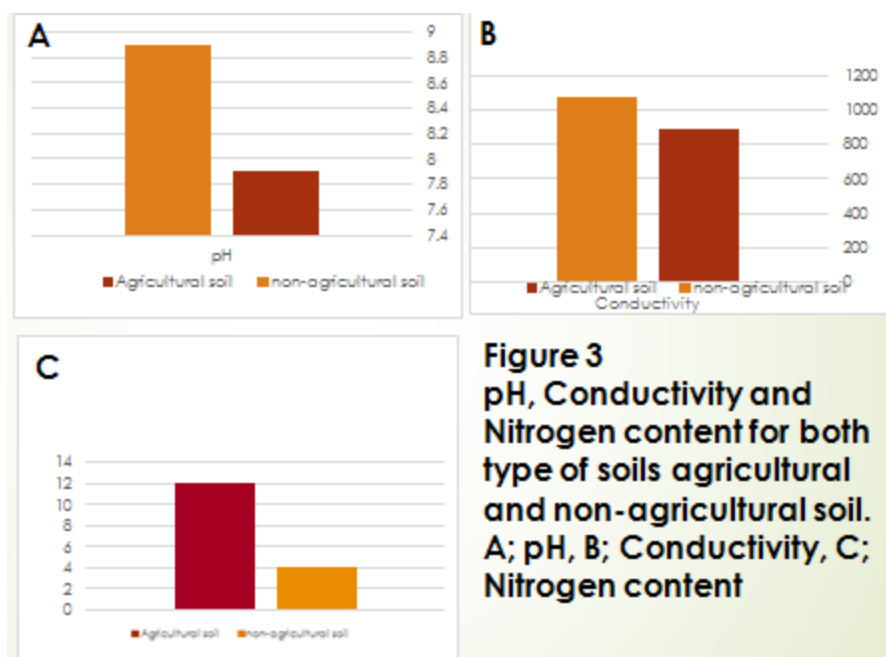
Figure 2. One of the agricultural land and its map location Al-Madinah Al-Munawwarah where some soil samples were collected.

Site location North 24.529385 and East 39.675221

Results and discussions

Results of this study indicated that there were differences between the agricultural and non-agricultural soil. The average pH measurements of both type of soils (agricultural and non-agricultural) differed. The agricultural soil pH average was 7.8 (weak alkaline) (Figure 3). However, the pH measurements of the non-agricultural soil samples were moderately alkaline (8.9) (Figure 3). The pH of a soil will change over time influenced by factors including weathering and t agricultural practices, etc. It will also fluctuate through the year. Soil pH will affect directly how plants grow. Soil acidity was found to be one of the important of soil properties which may affect crop productivity around the world (Kochian *et al.*, 2004). In general, farmers favor agricultural soil with neutral pH to weak acid.

Soil conductivity was also compared between samples from both agricultural and non-agricultural soil collected from the sites. The average conductivity reading recorded was 889 μ 1074 μ for the agricultural non-agricultural soil, respectively. Salt accumulation affect conductivities readings. Soil conductivity was found strongly linked to water irrigation content of salts. Concentration of salts in irrigation water increased soil salinity (Ragaab, 2000). There other factors which may linked to increase salt concentration on soil and conductivity (Ayers and Westcot 1985).



Nitrogen was also measured and found that the agricultural soil has higher nitrogen content 14 PPM than non- agricultural soil which was 4 PMM (Figure 3). This could be due to the addition of fertilization or other reasons. The presence of free carbonate was also studied by adding 10 drops of the acid to samples collected from both sites. Severe reaction was observed for agricultural soil to that observed for non-agricultural soil. The agricultural soil conductivity found higher than that recorded for non-agricultural soil which was an indication for soil salinity.

Organic matter content and texture influenced directly by any biological activity in soil. In addition, soil microbe activities affect C and N ratio, which can be directly influenced by pH soils and this directly can affect other soil properties. In this study the presence of carbonate and nitrogen was higher on agricultural soil than that found in the non-agricultural soil. The average nitrogen concentration recorded in the agricultural soil was 14 PPM and only 4 PPM in the non-agricultural soil. This could be due to the biological activities and or addition of organic and non-organic fertilizers in the agricultural soil.

Recommendation

The agricultural soil in Al-Madinah Al-Munawwarah properties should be investigated in different area.

Agricultural soil should be protected and improved to support sustainable agriculture especially for those plants and trees such as date palm which it grows well in Al-Madinah Al-Munawwarah.

Acknowledgement:

We would like to thank Dr. Nadia Al-Kaff (Biology Department, Collage of Science, Taibah University Al-Madina *Al-Munawwarah*) for her general supervision and guiding and helping in English translation, to Dr. Hiba A. Alhazmi for supervising in writing the Arabic version of this study, to Ms Hayfa A.S. Alenzi (GLOBE teacher) for her guiding throughout our study, to Ms Mona Almrwane (GLOBE coordinator Al-Madina *Al-Munawwarah*) for her encouragement and support, to Ms Abeer M. Alhejaili (Science activity head, Department of Education, Al-Madina *Al-Munawwarah*) for her support and to and to our class mates for their help and support Sarah M. Alaloani, Jawaher Y. Aljurdi, Mariam A. Karshof, Yara A. Alburaikit and Asrar A.Tamayni.

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