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Physicochemical Characterization of the Soil from the Naama Region: Western Algeria

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ABSTRACT

The physicochemical properties of the soil play an important role in determining its fertility. The objective of our study is to determine the physicochemical parameters of the soil in the region of the wilaya of NAAMA (South-West of Algeria). The collected samples were analyzed for various parameters including soil pH, electrical conductivity (EC), organic matter content, moisture and nutrient content (nitrogen, phosphorus and potassium). The results showed that the soil of the NAAMA region had: i) a slightly basic to neutral pH range, ii) electrical conductivity values indicate moderate salinity levels, which can impact soil fertility and plant growth, iii) for organic matter we observe a considered concentration which can be explained by the transfer of organic compounds from organic industrial effluents[1]. The results of our study provide much needed insights into the physicochemical properties of soils in the NAAMA region. These results serve as the basis for our doctoral thesis which focuses on the transfer of organic pollutants in the soil-plant system.

Keywords: Soil, characterization, fertility, physicochemical properties

1 Introduction

Soil is a natural resource that has a crucial role in supporting diverse ecosystems and maintaining agricultural productivity[2]. The physicochemical characterization of agricultural soil is essential for understanding soil fertility. Agricultural soil fulfills three important roles: a physical role (for supporting plant roots), a chemical role (for mineral nutrition of plants) and a biological role (it acts like a living environment) [3].

2 Experimental

2.1 Sampling

We used a clean sampling tool to collect soil samples. The soil was taken from a depth of approximately 6 to 8 inches.

2.2 Analysis

Determine the specific parameters we want to test, such as soil pH, nutrient levels and organic matter content. pH tests were performed using a pH meter or soil pH test kit. Nutrients were analyzed by laboratory tests.

3 Results and Discussion

The determination of the physicochemical properties of our soil has shown that:

- **pH:** The pH value is between 7.91 and 8.01, which indicates a slightly basic pH.
- **Electrical conductivity (EC):** The range of our analysis is between 279 and 301 uS/cm (0.279, 0.301 Ds/m) indicating a normal salinity level.
- **Moisture**: The moisture of a soil is used to determine the diffusion or storage characteristics of water in the soil. Our analysis showed that our sample has 12.86% of moisture, which explains its high capacity to absorb water.
- **Organic matter (OM)**: The rate of organic matter is equal to 1.81%. In general, the "OM" represents 1 to 10% of the mass of the soil. Organic matter plays a fundamental role for other

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compartments of the environment by helping to maintain water quality through their strong capacity to retain organic pollutants.

- **The nutrient content (NPK):** Our nutrient needs of our soil are satisfying by the contribution of "NPK" elements with 0.21% in nitrogen, 1.28% in potassium and 114 ppm in phosphorus.
- **Sieving**: We can distinguish that the largest percentage of diameter of our sample is between 200 and 63 µm, with a total percentage of 79.64%.

Table I*: Physico-chemical parameters of the soil of NAAMA region*

Parameters	pH	CE (uS/cm)	Moisture	OM	(N)	(P)	(K)
Results	7.91-8.01	279-301	12.86%	1.81%	0.21 %	114 ppm	1.28 %
Sieving							
2mm		500 µm		200 µm	63 µm		50 µm
5.64 %		10.98 %		43.89 %	35.75 %		3.74 %

4 Conclusions:

Characterization of the physicochemical properties of NAAMA region soil is crucial to understanding soil fertility, nutrient availability and overall soil health. Our results showed the importance that we must give to the properties of our soil to better understand its characteristics.

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