

SOIL FERTILITY ASSESSMENT FOR SUSTAINABLE AGRICULTURE: USING NUTRIENT AND PRODUCTIVITY INDICES IN CHEBLI, MITIDJA PLAIN, ALGERIA

Abdelkader Laribi¹*, Amel Krireche¹, Zahida Dehnoun²

¹Agricultural Water Management Laboratory (LMEA), Soil Science Department, National Higher School of Agronomy (ENSA), ES1603, El Harrach, Algiers, ALGERIA

²Land Use Planning Department, National Institute of Soils, Irrigation and Drainage (INSID), Hassen Badi, El Harrach, Algiers, ALGERIA

*corresponding author: abdelkader.laribi@edu.ensa.dz

Ensuring food security in the face of growing global demand and environmental constraints requires the sustainable management of agricultural soils. Soil chemical fertility plays a critical role in crop productivity and, consequently, in the long-term capacity of agricultural systems to meet food needs. In this context, understanding the status of key soil nutrients—namely nitrogen, phosphorus, and potassium—is essential for guiding effective land management strategies. This study, conducted in the municipality of Chebli, aims to evaluate the chemical fertility of agricultural soils using both the Nutrient Index (NI) and the Productivity Index (PI). The investigation was based on 18 composite soil samples collected from the surface horizon (0–20 cm). Analytical results show that all samples (100%) exhibit low total nitrogen levels, ranging from 0.10% to 0.23%. Available phosphorus concentrations ranged from 2.07 to 75.46 mg kg⁻¹, with a mean value of 19.70 mg kg⁻¹. Similarly, potassium availability was generally low, with 67% of the samples in the low category, 28% in the medium category, and only 5% in the high category. The Nutrient Index assessment classified the soils of Chebli as having moderate fertility with respect to organic matter and available phosphorus, and low fertility for nitrogen and potassium (NI pattern: MLML). Additionally, the application of the Productivity Index revealed three distinct productivity classes, with a predominance of the moderate productivity class (PI between 41 and 60). These findings highlight the urgent need for targeted chemical and organic amendments to restore nutrient balance, enhance soil fertility, and ultimately support food security through sustained agricultural productivity. Moreover, the results of this study provide a scientific basis for developing site-specific fertilizer recommendations that align with the actual nutrient needs for crops in Chebli.