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Evaluation of groundwater quality for irrigation purpose in the south-eastern of Tunisia (Menzel Habib area)

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Abstract

Groundwater is considered an important water source for agricultural uses in many regions of the world including Menzel Habib area, south-eastern Tunisia. Indeed, groundwater availability and quality became crucial in agricultural activities. Thus, pH, Electrical Conductivity (EC), Total Dissolved Solids, SO₄, Cl, HCO₃, Na, Ca, Mg and K were determined in 39 selected groundwater samples. The obtained results indicate that sulfate is the dominant anion, while sodium is the dominant cation. The groundwater samples from Menzel Habib aquifer system are characterized by Na-Cl, Na-SO₄ and mixed water types. The suitability of groundwater for irrigation was determined on the basis of various parameters such as: sodium adsorption ratio (SAR), % Na, Kelly ratio (KR), magnesium adsorption ratio (MAR) and permeability index (PI). The Kelly ratio results indicate that 61.5% of groundwater samples are unsuitable to irrigation due to surplus (> 1) sodium content. The MAR ratio demonstrates that only 8% of groundwater samples fall in bad category. However, relatively to the % Na, 18% of groundwater samples are classified as good, 49% as permissible and 33% as doubtful for irrigation purposes. Groundwater from Menzel Habib aquifer were plotted on the USSS classification based on SAR and EC and are distributed as: 8% on the area of C4S2 (high salinity and medium alkalinity), 2.5% on the C4S3 (High salinity and high alkalinity) field, 23% on the C5S2 (very high salinity and medium alkalinity) area, 10% on the C5S3 (very high salinity and high alkalinity) area and 56.5% is on the unclassified group (EC > 10000 μ S/cm and SAR > 32).

Key words: Groundwater; Suitability; Irrigation; Menzel Habib; Tunisia