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Soil Salinity and Soil Structure Dynamics Under Land Cover Changes In a RAMSAR Saline Inland Wetland: Case Study - BAZER-SAKRA SABKHA, Sétif (North-East of Algeria)

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Introduction

Soil salinization is one of the major environmental threats that limits soil and crop productivity (Pooja et Rajesh, 2015).

Soil structure is one of the fundamental properties that describe the physical functioning of the soil (water and air movement, and temperature regulation), and affect the sustainability of terrestrial ecosystems (Kay, 1990; Stengel et al,, 2009). In fact, Clay particles and their assemblages (aggregates) with other minerals and organic matter are important for maintaining the integrity of soil structure; however in saline and sodic environment, in particular when there is an excess of Na^{+} and K^{+} relative Ca^{+2} , **this integrity is threatened and soil structure can be degraded irreversibly thus affecting the quality of soil** (Rangasamy et al,; 2018). **Inland saline wetlands** are important ecosystems for preserving endemic plant species (halophytes and hydrophytes) and aquatic birds. and **changing land use in these fragile ecosystems can harm their sustainability** (Aliat et al,, 2016).

OBJECTIVE OF THE STUDY

The Assessment of the DYNAMICS OF SOIL SALINITY AND STRUCTURAL STATES ACCORDING TO THREE LAND COVER (Cropland, Tilled fallow, Halophytes plant cover) IN AN INLAND SALINE WETLAND OF BAZER SAKHRA (Setif, ALGERIA)

Methodology

1. Site description

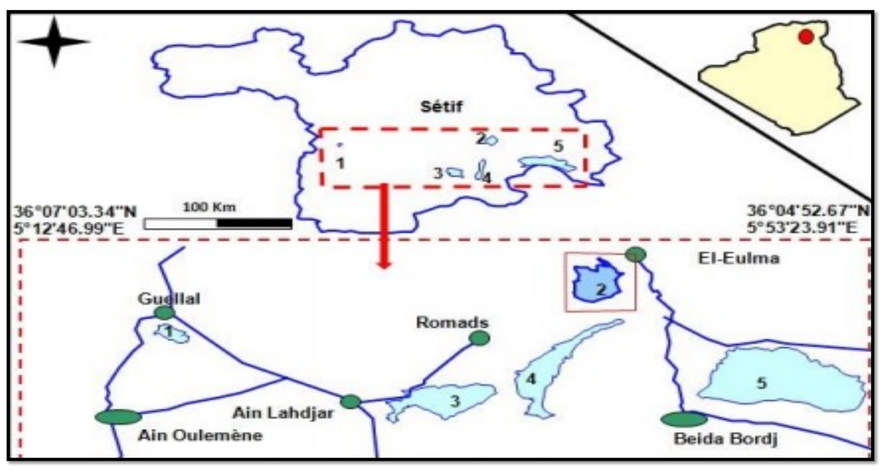

Fig1 :Ecocomplex of saline wetland in setif region (2 : Study area)

The figure shows the geographical distribution of the wetland eco-complex and our study has focused on the bazer sakhra saline wetland (2 in the figure) which has a permanent lake and is an internationally RAMSAR-protected wetland since 2004.

2. Soil Sampling and Land Cover site description

The soil sampling period is the end of the **wet season** (May 2022), We sample the soil using a manual auger at two soil depth **(0-20 cm and 20-40 cm)**. **4 soil profile (cropland) , 2 soil profile (tilled fallow)** and **1 soil profile (in saline wetland)**

Methodology (suite)

Fig.2 : LAND COVER OF SAMPLING PROFILE: A) cropland , B) Tilled fallow, and C) halophyte sueda species

3. EC measurement and estimation

Air-dried soil samples and sieved soil sample (14) have been measured to determine EC of 1:5 soil/water extract; then the measured EC 1/5 values have been converted to EC of saturated paste using linear regression $\mathbf{CE_{p.s} = 8{,}7554 CE_{1:5} - 0{,}7591}$ $\mathbf{R^2 = 0.961}$ **(n=8)**

4. Soil Structure Assessment at Two different hydric States

Soil structural stability using **wet sieving techniques** at two hydric states: 1) **humid aggregates** and in **natural state** (cm) and 2) **air-dried and sieved to 2 mm**. The percentage of stable aggregate is calculated as a mass of aggregate in the sieve (0,25 mm) divided by the total mass of soil aggregates (5 g)

Results and Discussion

Table 1: ESTIMATED ELECTRICAL CONDUCTIVITY OF SATURATED PASTE ACCORDING TO LAND COVER AND SOIL DEPTH

Land cover	Halophytes plant cover	Cultivated land with cereals				Uncultivated as tilled fallow	
Profile abreviation	P_{halo}	$P1_{Cer}$	$P2_{Cer}$	$P3_{Cer}$	$P4_{cer}$	$P1_{Fallow}$	$P2_{Fallow}$
CEsp (0-20 cm) dS/cm at 25°c	11,642	4,791	4,733	4,704	4,66	0,633	4,675
CEsp (20-40 cm) dS/cm at 25°c	9,734	4,85	4,87	4,74	1,957	1,28	4,74

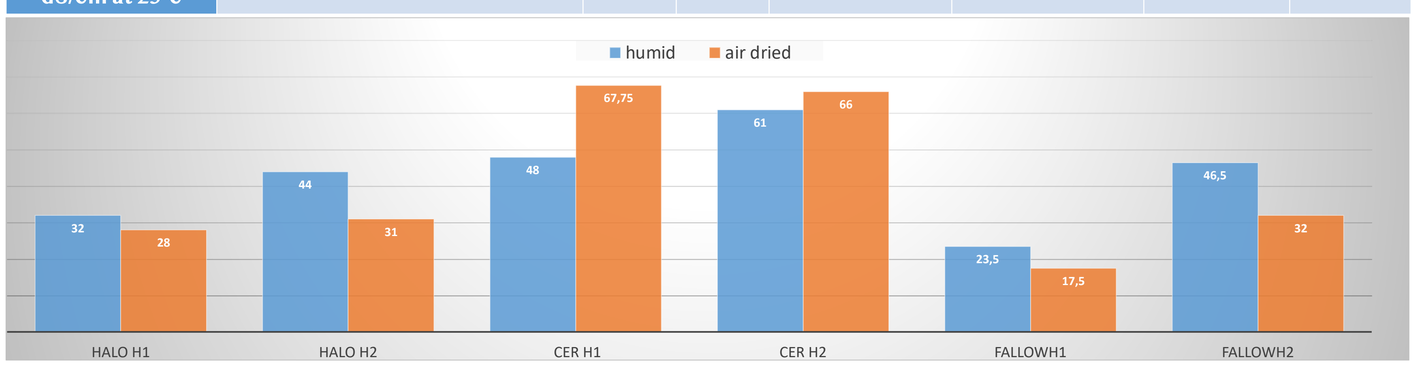

Fig.3: structural stability index according to land cover and hydric states

Summary and Conclusions

- Overall, the salinity of soil samples are highly saline and saline in halophytes plant cover and cropland, but in the tilled fallow especially the first profile, the soil sample is not saline;
- Regarding the soil structural stability, our results show high stability in cropland compared to fallow and halophyte plant cover irrespective of the hydric state and sieving, however, the trend is reversed when we include the hydric states where there is more stability in the hydric state (natural aggregate) comparing to air dried and sieved state in halophyte and tilled fallow.

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