THEME 1

Carbon dynamics in soils of wetlands in northeastern Algeria

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INTRODUCTION

Wetlands are complex ecosystems, the product of ecological, hydrological and climatic processes that have been associated with the action of living organisms, including humans. Wetlands are areas of transition between land and water. These spaces have very different ecological and economic realities.

Wetlands are reservoirs of life and places where the production of living matter is one of the strongest. They provide 25% of the world's food supply through fishing, agriculture and hunting. They are among the most valuable natural resources on the planet, but also among the most fragile. They are therefore of major importance for the conservation of biodiversity because of their very high species richness, both floristic and faunistic (CUCHEROUSSET, 2006).

They have a powerful purifying capacity, filter pollutants, reduce erosion, contribute to the renewal of groundwater, and naturally store carbon.

In East Algeria there is a range of wetlands in various ecosystems linked either to favorable climatic conditions or to specific soil conditions.

Numidia is remarkable for the diversity of its vegetation cover. According to Thomas, (1975); Aouadi (1989); De Belair (1990) and Belouahem (2014), the vegetation of the region is divided into five main series: Cork Oak Series; Series of Oak Zeen; Kermès Oak Series; Marine Pine Series; and the Wetland Plant Series which extends along the banks of lakes and streams, as well as in wet depressions.

OBJECTIVES

To understand the dynamics of organic debris and to follow the fate of organic carbon produced by a dense and diverse plant cover, in a hot, dry summer favoring biological activity (high mineralization) and a cold, wet winter favoring the accumulation of organic debris.

This dynamic is reflected by the alternation of humification phase and humic compound condensation in wet season, and a high biological mineralization activity of organic debris during the summer.

In this work, we limited ourselves to the fractionation of the organic matter of the soils along a topographic transect according to the protocol defined by Dabin (1976).

Fig. 1: Soil Sampling in Northeastern Algeria

Fig. 2: Soil Description and sampling - wetlands

MAIN RESULTS

The fractionation of the organic matter in the different stations revealed a predominance of the light fraction relative to the humified fraction.

The presence of water in large quantities saturates the soil, inhibits biological activity and promotes the physicochemical transformation of organic matter (physico-chemical humification) to the detriment of biological activity (Duchaufour, 2001; Gobat *et al.*, 2003) .

The products of physicochemical humification are dominated by compounds represented by soluble fulvic acids in low acid solutions and are easily mobilizable and migrate with soil solution at depth (Morard, *et al.*, 2003). At the studied sites, this fraction represents about 50% of the humified carbon. In the studied soils, the fraction of organic matter represented by the humic acids is relatively small and does not exceed about 30% of the fraction of the humified carbon.

The stable fraction of the organic matter represented by the humine is very low in all the studied soils, which means that the processes of maturation of the organic matter remain unfinished (Garnier-Sillam *et al.*, 1999).

Oxygen deficiency reduces biological activity to the benefit of anaerobic processes. What does it favour? This phenomenon favors the accumulation of poorly transformed organic matter with the formation of a humus of peat type in the center of the humid depressions and an “Anmoor” type humus (15-30% SOM) on the banks of the depressions where the water table fluctuates.

Fig. 3: Soil Auger

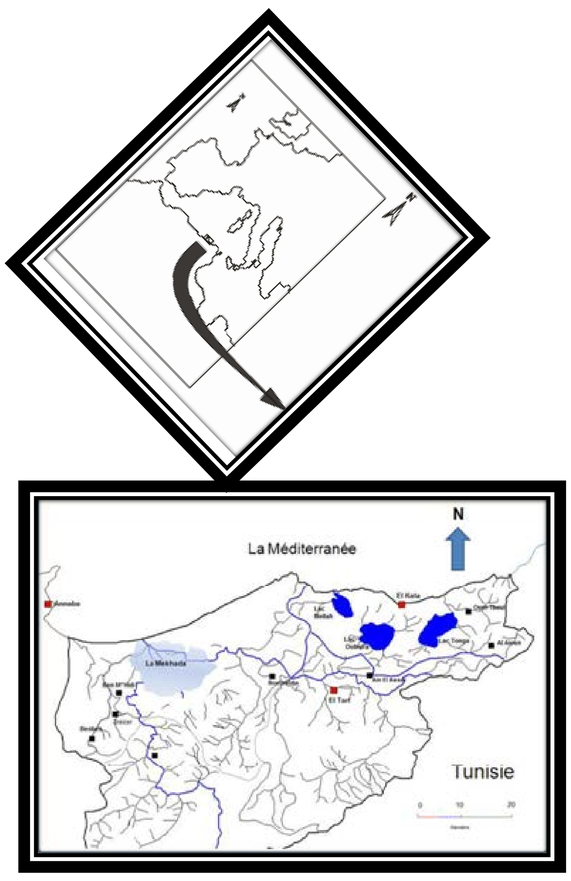

Fig. 4: Map of the study area

CONCLUSION

It is evident that the dynamics of organic matter, which is controlled by fluctuations in the water table and especially by the presence of a permanent water body, constitutes a pedogenic process that is not frequent in our climate and leads to formation and individualization of very localized and still ill-defined soil types that generally evolve in a Mediterranean pedogenic context dominated by water deficit.

The presence of such soils suggests that moisture conditions have played and still play a role in the formation and differentiation of these soils, or at least in their maintenance (Bernoux, 2005). The accumulation of poorly processed organic debris with thicknesses as large as ours suggests that carbon sequestration processes are still active despite the climatic conditions prevailing in this region.