Nitrogen Cycling in a Temperate Estuarine Mud Flat

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Salt marshes and mudflats are inherently zones of material deposition Organic matter deposited within the system is mineralised, releasing decay products, including nutrient species The tidal inundation and emersion cycles allow an exchange of materials between the marsh and the estuary Northern hemisphere studies have shown salt marshes to be net exporters of OM to adjacent mud flats. This study was aimed at understanding the role of the mudflats in both carbon and nitrogen cycling within the estuary according to the conceptual model below.

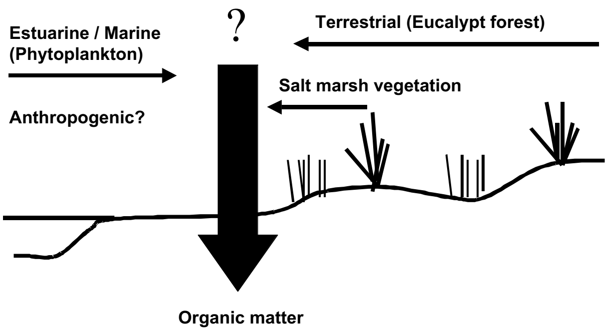

Figure 1: Conceptual Model of Nitrogen inputs to estuarine mud flats

Stable isotope data indicated the mud flat nitrogen was relatively depleted in ^{15}N, as was the higher salt marsh, while the intermediate salt marsh was relatively enriched (probably marine derived N). This indicated that the mud flats could be important areas of N-fixation and this was supported by the isotopic signature of benthic microalgae isolated from the mud flat and labelled N_2 uptake experiments.

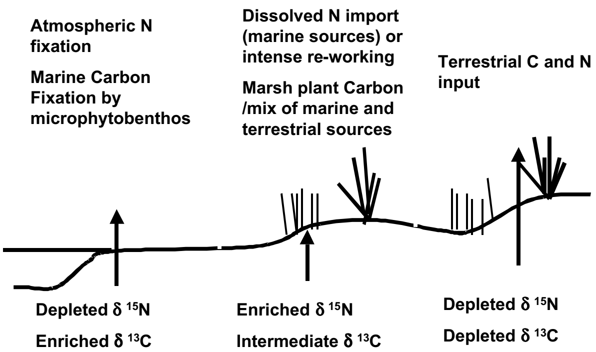

Figure 2: Schematic representation of stable isotope data

Wastewater-irrigation effect in physical and chemical soil properties of Mezquital Valley, Hidalgo State, Mexico.

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Introduction

Wastewater irrigation in crop soils of Mezquital Valley has been carried out since one hundred years ago, irrigation areas have been increasing little by little according to rural demand. Wastewater flows from Mexico City through the Deep Drainage System and the Great Drainage Channel arriving to Rural Development District 063 (RDD-063). Wastewater application in this semiarid region, increases crop production and save fertilizers expenses to the farmers. To understand if soil physical and chemical characteristics are affected by wastewaters application is a priority by the need to improve soil fertility and conservation. In this work physical and chemical propierties in irrigated soils with wastewater on several periods of time were determined.

Materials and Methods

Study area was selected in wastewater irrigated RDD-063 sector at 99º28´ to 99º12´ W and 20º17´ to 20º31´ N at 2070 masl. Random sampling by soil profiles was carried out on plots with wastewater irrigation periods corresponding to 100 y^{-1}, 50 y^{-1} and 5 y^{-1}. Thirty two samples of 11 profiles were taken, air-dried and sieved for physical analysis: soil color, bulk density (BD), density, texture, pH, electric conductivity (EC), and chemical analysis: cation exchange capacity, Ca, Mg, Na and K exchangeables, total organic carbon (TOC), total nitrogen, phosphorus, $CaCO_3$ content and previously soil morphology in profiles was described.

Results and Discussion.

Soils were classified as Rendzic leptosol (plots 1 and 2), Calcaric phaeozem (plots 3-9) and Luvic phaeozem (plot 10-11). Soil have high concentrations of TOC, phosphorus and nitrogen. pH ranges are basic to neutral. Electric conductivity is low. N total, phosphorus, TOC, and sodium-potasium index increase, but $CaCO_{3,}$ pH decrease with irrigation time. Propierties also affected by differential depositation of organic matter and nutrients by location of irrigation channels, wastewater quality and farmer handling.

Conclusion

Chemical and physical soil properties (EC, pH values and TOC, $CaCO_3$ content) suggest that irrigation has positive effects in soil by leasivage. Salinization is not evident.

References

Stevenson, F. J. & M. A. Cole. 1999. *Cycles of soil: carbon, nitrogen, phosphorus, sulfur & micronutriments.* John Wiley & Sons. New York, USA. 427 p.