

## Impact on Soil Microbial Properties Amended with Biosolids Coming from Sewage Treatment Processes in Senegal

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### Abstract

The aim of this study was to assess the genetic structure of the total community and nitrifying bacteria (ammonia oxidizing bacteria AOB) on horticultural soils amended with an activated or stabilized sludge. DNA extraction, PCR and denaturing gradient gel electrophoresis (DGGE) analysis were performed on soils in laboratory controlled conditions for 21 days. The addition of stabilized or activated sludge in a soil resulted in changes of the total bacterial community structure compared to a control soil without amendment. The incubation of this sludge and soil mixture during 21 days implied an evolution of the diversity of total bacterial community. Sludge amendment did not have a major impact on the nitrifying community (AOB). However, the time of incubation has to be extended to show the long term effect, and long term observations have to be managed when repeated addition or high amendment of sludge is made.

### INTRODUCTION

In Sub-Saharan African countries as Senegal, peri-urban horticulture is expanding quickly. This contributes to food security and economic development. At the same time, the very large amount of waste produced by the urban population is a huge problem that needs to be managed. Recycling the waste waters can procure organic fertilizers and contribute to soil fertility management (Dudowski, 2000). In Senegal, for instance, only a small amount (0-10% in developing countries) of the wastewater produced by the city of Dakar was processed. However, authorities started to develop the establishment of sewage treatment plant. The urban farmers who previously used the untreated wastewater now apply activated and stabilized sludge from waste water treatment plant as fertilizers. However, the impact of such organic by-products on tropical soil was not very well known so the organic products they used came from an incomplete process. Indeed, some sludge they applied had not undergone the last stage of wastewater treatment that transforms an activated product in a stabilized product. Sludge from wastewater treatment contains plant available nutrients and organic matters that stimulate biological activity in soils. This work presents an investigation of the impact of the use of different sludge in market gardener tropical soils of Senegal. The results focused on the microbial biodiversity of soils as this indicator is particularly important in the soil fertility management of cropping systems according of its implication on the main cycle of carbon, nitrogen and phosphorus. So, the structure of the total bacterial community and the ammonia oxidizing bacteria (AOB) were assessed by molecular methods in a incubated soil with two organic product sludge: activated sludge and stabilized sludge.

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