

The effect of different vegetation covers on the emissions of nitrous oxide (N₂O) in a semiarid tropical region (PE-BR).

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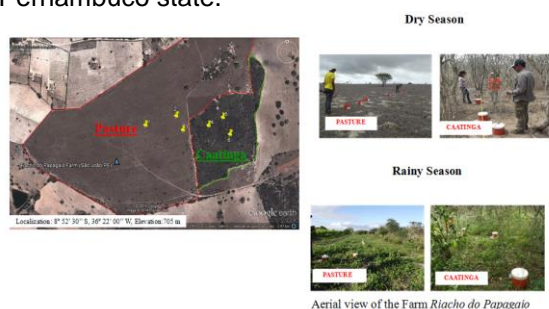
Introduction

This work aims to study the variation in the emission of nitrous oxide due land use changes in the “caatinga” of Pernambuco/PE. The “caatinga” biome is an area of semi-arid environment, the only exclusively Brazilian biome, occupying an area of 970,000 km² (11.4% of the country) with about 22 million inhabitants where 12 million lives under drought condition. It is one of the poorest and less developed region of the country due to poor management of the prolonged droughts leading to environmental weakness.

Study Site



Changes in land use and land cover are one of the most impactful environmental problems in the biome due to common practice of converting native vegetation in pastureland which represents about 201.786 m² (27% of the biome). This study was conducted in the municipality of São João, in Pernambuco state.



Samples were collected in the years 2013 and 2014 (dry and rainy season). The flows were measured in static PVC chambers in periods of 30 minutes and analyzed by gas chromatography. The design of this experiment consisted of two treatments: native vegetation- “Caatinga” (C) and pasture (P), distributed in three blocks (repetitions).

Results and Discussion

A significant seasonal variation in soil emission of N₂O (p = 0.0000) was observed, where the largest nitrogen, as nitrous oxide emissions, losses occurred in the pastureland (p = 0.0514) compared with the “caatinga” ones for the dry season. Generally, the N₂O production rate is associated with anaerobic soil denitrification and in this study we observed that soil moisture had direct influence on microbiological activity which led an increase in nitrogen soil emissions due to nitrogen species volatilization from residual fertilizer deposited on the studied site when pastureland was established.

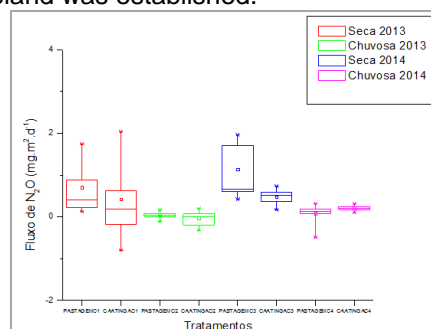


Figure 1. Fluxes of nitrous oxide (N₂O) in the different vegetation cover.

Low soil moisture levels prevents urea from fertilizer to be incorporated by the soils therefore producing a significant emission of nitrogen to the atmosphere.

Conclusions

These results suggest a tendency of N₂O increase when a decreased in soil moisture is present which may be strongly influenced by land use changes in this biome. N₂O emissions were significantly higher in the pastureland. These results also will be used for future comparisons with similar regions located in the Brazilian Northeast, as well as in other semi-arid regions of the planet.

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