

Study area characterization and preliminary results on GHG emissions in eucalyptus forest, Mato Grosso do Sul

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Introduction

Forestry in the Cerrado Biome have the potential to act as carbon sink and storage and can be used as climate change mitigation option through compensatory planting. The Cerrado occupies about 23% of the national territory, presenting varied physiognomies. The Cerrado *sensu stricto* (herbaceous layer with different densities of tree and shrubs) is the predominant physiognomic type with total extent of about 41.8 million hectares. The Cerrado biome may play a significant role on global carbon balance due to carbon storage and fixation. However, vast areas of Cerrado have been degraded as a result of extensive and frequent fire mainly related with cattle ranching.

Planted forests in Cerrado are predominant comprised of eucalyptus, which are generally established on degraded pasture. Fast growing Eucalyptus boosts absorption of carbon dioxide from the air and therefore Eucalyptus forestry is considered as a greenhouse gas mitigation option. This study presents a preliminary evaluation of greenhouse gases (GHG) emissions from planted forests in the Cerrado of Mato Grosso do Sul, Brazil.

Materials and methods

Initially, a survey was performed to identify the vegetation types

associated with Eucalyptus plantation. Then the study area was characterized according to soil type, topography, rainfall and land use. The GHG emissions from soil were measured in a stand inside of the Eucalyptus plantation using a static chamber based technique. Samples for determination of the GHG fluxes at soil-atmosphere interface were collected at monthly intervals.

Each chamber is mounted on a metal base of 0.24 m^2 , which was placed approximately 0.07-

0.05 m deep into the soil and stayed installed during the entire field operation. A built-in trough 0.09 m height, which holds water, was attached to the metal base to prevent gas leaking. An insulating material was used to cover the water trough to prevent temperature gradients between the interior and exterior of the chambers. First air sample was taken immediately after chamber placement on the base and then after 30 minutes. Samples were collected to evaluate the evolution of the concentration of a gas in the closed chamber with time (linearity test). Concentrations of CO_2 and N_2O in the samples were determined by use of gas chromatography.

Results and Conclusions

Sampling was carried out at the Ribas do Rio Pardo county ($20^{\circ}38'54''$ S and $54^{\circ}02'10''$ W - 453 meters above sea level), State of Mato Grosso do Sul. The original physiognomic type in this region was cerrado, which was converted into pasture in the 1970s. Due to the inappropriate use occurred degradation. The area was then leased to the planting of eucalyptus clonal called "urograndis". This is a *Eucalyptus grandis* and *E. urophylla* crossing, planted at $3 \times 2.5 \text{ m}$ spacing. Its total area is about 1640 hectares, being characterized by undulating topography (8 to 20%) and Quartzsandy Neosol ortic soil type.

The results indicate that CO_2 emissions in the area of study present seasonal fluctuation. CO_2 emissions were markedly higher from

October to December, which correspond to the rainy season in the Cerrado of Mato Grosso do Sul. Suggesting that CO₂ flux in the interface soil- atmosphere may be affected by soil moisture. Other preliminary results will also be presented.

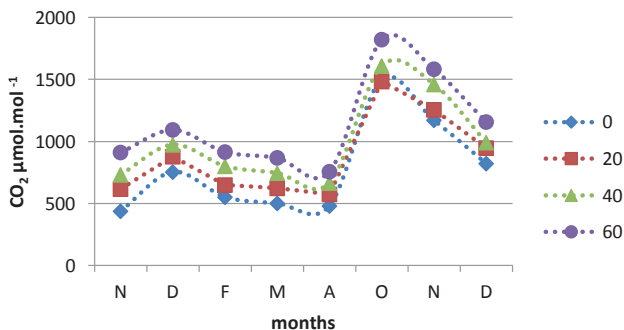


Figure 1: Carbon accumulation in chambers throughout the year, 0 to 60 minutes, in the eucalyptus forest, Mato Grosso do Sul state.

References

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