

Variability of Nitrous Oxide and Methane emissions from soils under Eucalyptus forests in the Cerrado (Brazilian savanna)

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Introduction: *Eucalyptus* sp is one of the most promising genuses to provide forest canopy for Integrated crop-livestock-forest systems in the Brazilian savanna - Cerrado. Despite the high carbon sink potential in Eucalyptus timber, little is known about green house gases emissions from this category of forest, such as nitrous oxide (N₂O) and methane (CH₄). In this context, the purpose of this study was to evaluate the small-scale spatial variation of N₂O and CH₄ soil emissions from soils under Eucalyptus forests in the Cerrado.

Material and Methods

The study was performed at the rural settlement Quebrada dos Neres, Paranoá – DF, Brazil in a Clayey Oxisol (Typic Haplustox). The experiment was carried out on two eucalyptus forests (*Eucalyptus urophylla* x *Eucalyptus grandis*) denominated treatments: EAC 1528 clone planted in 2011 (**Eucalyptus 1**) and GG100 clone planted in 2009 (**Eucalyptus 2**). Treatments were disposed in three pseudo-plots in which soil fluxes of N₂O and CH₄ were evaluated by four static manual chambers laid out in pairs both within the row and inter row spacing. Air sampling events of N₂O and CH₄ fluxes were performed from Jan-Feb/2014 and samples were analyzed by gas chromatography.

Results and Conclusions


Tab. 1. Greenhouse gases monitoring in eucalyptus forests: mean, mean standard deviation (SD) and confidence intervals for row (A and B) and inter row spacing (C and D) positions.

Parameters	Eucalyptus 1				Eucalyptus 2			
	A	B	C	D	A	B	C	D
----- N-N ₂ O µg m ⁻² h ⁻¹ -----								
Mean	1.29	3.85	0.48	-0.46	4.36	2.33	4.20	4.45
SD	1.05	2.94	0.60	1.54	2.97	1.43	2.03	13.35
CI 95%	-1.9 to 8,4	-0.8 to 13.3	-3 to 18	2.6 to 12.9	-0.6 to 2.9	0.1 to 10.8	-4.6 to 5.4	-4.2 to 22.9
----- C-CH ₄ µg m ⁻² h ⁻¹ -----								
Mean	-78.07	-87.66	-33.39	6.17	-21.12	-14.22	-25.23	-22.21
SD	21.36	20.97	11.26	29.88	17.29	10.60	16.25	10.70
CI 95%	-113 to -35.3	-49.9 to 7.6	-117.8 to -57.5	-28.9 to 0.5	-77 to 10	-51.5 to 1	-75 to 58	-34.8 to -5

Overall results evidenced spatial variations, low N₂O and generally negative CH₄ flux rates. These findings indicates that soils from three and a half to to six years old Eucalyptus forests act as a CH₄ sink and it is imperative to identify biological underlying controls of site spatial variability to accurately quantify ecosystem fluxes.

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