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Soil carbon sequestration in grass and grass-legume pastures in the western Brazilian Amazon

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Introduction

Land use change from native forests to pastures in the tropics have impact on global carbon cycle through increased rates of C emissions to the atmosphere and the loss of above- and belowground C accumulation and storage capacity (SILVER et al., 2000). This study was conducted to determine the carbon stock in a Ultisol under a pure *Brachiaria humidicola* (Rendle) Scheick pasture and a mixed pasture of *B. humidicola* and *Arachis pintoi* Krapov. & W. C. Greg cv. BRS Mandobi, both without fertilization. A native forest classified as Bamboo open+dense, on the same soil type, was the reference land use with 137 Mg ha^{-1} of above-ground live biomass (SALIMON et al, 2011).

Material and Methods

The experiment was stablished in 2011 at the Guaxupé farm in Rio Branco, state of Acre, Brazil. Deforestation of the experimental area occurred in 1981. Soil sampling was carried in the pure *Brachiaria humidicola* pasture (G), in the mixed pasture of *B. humidicola* and *Arachis pintoi* cv. BRS Mandobi (GL), and in a native forest (NF) classified as Bamboo open+dense, on the same soil type. In order to account for inter annual variation, soil carbon stocks were measured in 2012 and 2015, in the 0-0.05, 0.05-0.10, 0.10-0.15, 0.15-0.20, 0.20-0.30, 0.30-0.40, 0.40-0.50, 0.50-0.70, 0.70-0.90 and 0.90-1.10

m layers. Carbon (C) content (EMBRAPA, 2011) and soil bulk density (BLAKE e HARTGE, 1986) were determined and C stocks calculated (ELLERT e BETTANY, 1995). Data of soil C stocks for 2012 and 2015 were averaged for the three land uses (NF, G and GL).

Results and Conclusions

There was difference ($P < 0.05$) in soil C stock among the different land uses. Soil C stocks (Mg C ha^{-1}) were 52.8 ± 2.2 in the NF, 72 ± 5.5 in the pure G pasture and 65 ± 10.9 in the mixed GL pasture. Soil C stock in pure G pasture was greater than in NF but similar to mixed GL pasture. There was no difference between soil C stock of NF and mixed GL pasture (Figure 1).

Soil C stocks in the pure G and in the mixed GL pastures represent gains of 36% and 23% respectively, over 34 years in relation to the NF (Figure1). This means a rate of soil C accumulation (Mg ha^{-1} $year^{-1}$) of 0.56 and 0.36 in the pure G and in the mixed GL pastures respectively in this time span. This calculation does not consider the C stock in the aboveground biomass that was lost by burning during deforestation in 1981. In this respect, the gain of soil C stock in the pure G and mixed GL pastures represent 14% and 9%, respectively of the 137 Mg C ha^{-1} in the above-ground live biomass in the NF (SALIMON et al, 2011).

Soil C accumulated in the pure G and mixed GL pastures in relation to the NF, over the 34 year period, was 70.3 and 44.5 Mg CO_2 ha^{-1}, respectively. This indicates that the pastures are functioning as a C-CO_2 drain from the atmosphere, offsetting part of the carbon lost since deforestation in 1981.

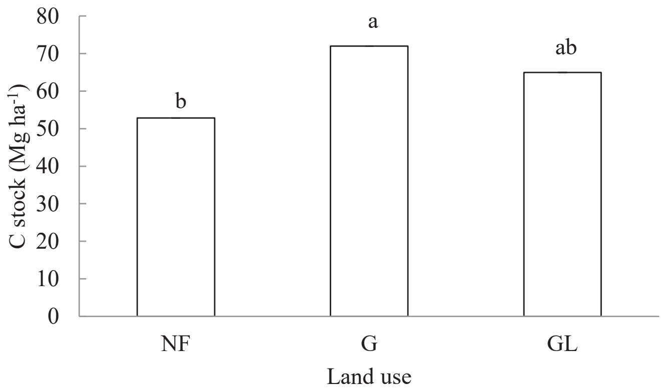

Figure 1. Average 2012-2015 of soil carbon stock (0-1.10 m) at the Guaxupé farm, Acre State, Brazil. NF = native forest. G = single pasture of Brachiaria humidicola and GL = mixed pasture of B. humidicola with Arachis pintoi cv BRS Mandobi. Values are mean of three observations. Different letters indicate significant differences among land uses according Tukey test (P < 0.05).

References

BLAKE, G. R.; HARTGE, K. H. Bulk density. In: KLUTE, A. (Ed.). **Methods of soil analysis**. Part 1. Physical and mineralogical methods. Madison: ASA/SSSA, p.363-375. 1986.

ELLERT, B. H.; BETTANY, J. R. Calculation of organic matter and nutrients stored in soils under contrasting management regimes. **Canadian Journal of Soil Science**, 75:529-538, 1995.

EMBRAPA – Empresa Brasileira de Pesquisa Agropecuária. **Manual de métodos de análise do solo**. 2ª ed. revista. Rio de Janeiro: Embrapa Solos, 2011. 230p.

SALIMON, C. I. et al. Estimating state-wide biomass carbon stocks for a REDD plan in Acre, Brazil. **Forest Ecology and Management**, 262:555-560, 2011.

SILVER, W. L. et al. The potential for carbon sequestration through reforestation of abandoned tropical agricultural and pasture lands. **Restoration Ecology**, 8:394–407, 2000.

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