

# The Impact of the Implementation of an Integrated Crop-Livestock-Forest System in a Ferralsol of the Brazilian Savannah (Cerrado)

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*André Luiz SILVEIRA<sup>1</sup>, Beata E. MADARI<sup>2</sup>, Janaína M. OLIVEIRA<sup>3\*</sup>*

<sup>1</sup>PhD in Agronomy; <sup>2</sup>Researcher, Embrapa Rice and Beans, 75375-000 Santo Antônio de Goiás, GO, Brazil; <sup>3</sup>Post Doctoral fellowship, Embrapa Rice and Beans, 75375-000 Santo Antônio de Goiás, GO, Brazil; E-mail address of presenting author\*: janainamouraol@gmail.com

## Introduction

Conservationist agricultural systems and soil management should sequester carbon from the atmosphere. In this sense integrated Crop-Livestock-Forest systems (iCLF) stand out as an alternative because with its diverse composition promotes a range of environmental services, including being carbon (C) sink due to its removal by its forest component. However there is only little information on the potential that iCLF has for carbon accumulation in the soil. Therefore, these systems have to be evaluated under field conditions and in different biomes of Brazil so that we can confirm this behavior. This study aimed to contribute to the analysis of an iCLF system in the Brazilian savannah in Goiás state.

## Material and Methods

The evaluation was made three years after its implementation in southern Goiás State of Brazil, in the Boa Vereda Farm (18°27'43.19"S, 49°35'58.53"W), where the iCLF, conventional pasture (CP) and a recovered pasture (RP) were implemented. Total organic carbon (TOC) and nitrogen (N) concentrations were evaluated up to a meter depth in eight layers. In the iCLF each sampling point had six soil profiles placed in different positions to represent situations according to the presence or not of trees and transition zones between trees and pasture. The

soil texture, bulk density and the isotope ratio ( $\delta^{13}\text{C}$ ) were evaluated to validate the comparability of the investigated areas.

## Results and Conclusions

Study results showed that the management used during the implementation of iCLF, which included soil tillage with disc plowing, influenced negatively the C and N stocks in the 0-0.3m layer. Another factor that likely influenced the input of C and N in the soil was the low productivity of the pasture, result of the shading by the eucalyptus trees (*Eucalyptus urograndis*) on the grass (*Urochloa brizantha*), due to the implementation of eucalyptus rows in the north-south direction. Considering a layer 0.0 to 1.0 m, however, the management did not influence the stock of TOC and total N due to compensation of the loss of the stock of TOC and total N in the surface layer by the accumulation of these elements in deeper layers (0.3-1.0 m). Thus, despite the loss of carbon and nitrogen in the surface layer of the soil, it was possible to infer that the iCLF showed potential for carbon accumulation in the soil, the deeper layers after three years of its implementation.

**Acknowledgements** to Embrapa; CNPq and FAPEG/CAPES for financial supporting. A.L. SILVEIRA is grateful for CAPES scholarship; B.E. Madari is receiving CNPq PQ2 fellowship. The authors gratefully acknowledge Mr. Abílio R. Pacheco for making his farm available for evaluation.