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Evaluation of the soil carbon stocks in monocultures and a crop-livestock-forest integration system, in Brazilian Amazon.

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Introduction

In the past century, agriculture has grown and developed based on the expansion of new areas for cultivation, leading to deforestation of large areas of native forests and natural ecosystems and causing the loss of environmental services. Despite the great importance of the sector to the Brazilian economy and recognized change that it has undergone in recent years, agriculture still uses production practices that promote large impacts in natural resources. Therefore, it is necessary to change agriculture paradigm with the use of management practices that allow physical and chemical soil properties balance, such as carbon increase and nitrogen soil content. Several studies indicate that the use of integrated production systems, such as Integration Crop-Livestock-Forest (ICLF), improve Soil Organic Carbon (SOC) accumulation.

Objectives

The aim of this article is evaluated the potential of carbon stock and the quality of this stock in different types of management (eucalyptus forest, crop, livestock and ICLF) in Sinop, Mato Grosso State (Brazil).

Material and Methods

Soil samples were obtained in 2010 and 2014 for five layers 0-5, 5-10, 10-30, 30-60 and 60-100 cm at each site. Several analyzes were made: evaluation of carbon and nitrogen stocks, organic matter density fractionation and $\delta^{13}C$ of soil organic matter, in the top 30 cm. I

Results

CLF and livestock were the treatments that had the highest stock values of C and the largest percentage gain of SOC, and were also the treatments that had the largest nitrogen increase. ICLF was the only treatment that had an increase of N in all three evaluated layers and which had the highest percentage of carbon gain (5,5MgC/ha) in three years of experiment. This was because in ICLF the consortium pasture with crop (corn and soybeans) and the grass contributes with large amounts of biomass high C/N, increasing soil cover persistence. Management systems, such as ICLF, with low soil inversion and higher plant residues in soil, in quantity and quality in different soil layers by materials with different C/N ratios, provide an increase in the soil organic matter amounts.

Conclusion

The carbon stock data show that Crop-Livestock-Forest integration systems has a great potential to act as a low-carbon technology.