SOIL ENZYMES ACTIVITIES IN CERRADO´S GRAIN-CROPS FARMING SYSTEMS WITH BRACHIARIA.

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Introduction
Already observed for temperate conditions, soil enzyme measurements also have great potential as soil quality indicators in the tropics due to their sensitivity, responding faster to shifts in management practices than parameters like soil organic matter. The ease of measurement and low cost of soil enzyme assays also make them very attractive as part of a soil quality index.
The expansion of the soybean/corn double crop system in the Cerrados region, has been possible due to the adoption of no-tillage and the use of short-cycle soybean varieties. More recently, the integration of deep-rooted grasses into these double-crop farming systems, either as cover-crop or pasture for the cattle during the dry/winter season, is also an option that has been adopted successfully, allowing for a third harvest. The presence of brachiaria grasses in the agricultural systems increases the input of plant residues and provides soil protection during the dry season, favoring a more biologically active edaphic environment.
We evaluated the activity of soil enzymes in a grain-crop production system with a winter fallow, brachiaria grass as a cover-crop after soybean harvesting and where second-harvest corn is either cultivated alone or intercropped with brachiaria grass.

Material and Methods
The study area was located in Rio Verde, GO, Brazil in an area that had been under no-tillage with annual grain crops for 20 years. The soil is a clayey Typic Dystrophic Red Latosol. The experiment was established in 2007, in a randomized complete block design with four replicates. For this study, soil samples (0-10 cm depth) were collected from the following treatments: i) brachiaria (*U. brizantha* cv. Marandu) as a cover-crop after soybean harvest; ii) second-harvest corn cultivated alone, iii) second-harvest corn intercropped with brachiaria (*Urochloa ruziziensis)* and iv) winter fallow after the soybean harvesting. Soil sampling was performed in December, 2014 at the soybean flowering stage. The soil enzymes evaluated were β-glucosidase, arylsulfatase and acid phosphatase (Tabatabai, 1994), related to the C, S and P cycles respectively.

Results and Conclusions
The greatest enzymes activity levels were observed in the treatment with *U. brizantha* as a cover crop, after soybean harvest. In the other hand, the treatments under fallow and with second-harvest corn cultivated alone presented the lowest enzyme´s activities. Significant increases in β-glucosidase (40%), arylsulfatase (50%) and acid phosphatase (23%) activities were also observed in the system where second-harvest corn was intercropped with *U. ruziziensis,* as compared to the treatments under winter fallow and with second-harvest corn cultivated alone. These results show the capacity of brachiaria grasses to stimulate soil biology under the Cerrados conditions and confirm the ability of β -glucosidase and arylsulfatase to detect changes in the management system.

References cited
Tabatabai et al. (1994). SSSA Book Series

Acknowledgements
To Embrapa, CNPq, FAPEG and FAPDF.

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