

**UNIVARIATE AND MULTIVARIATE APPROACHES TO EVALUATE
THE CARBON-BASED PERFORMANCE OF AN AGRICULTURAL
EXPERIMENTAL DESIGN**

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ABSTRACT

In this paper, we contribute to the low-carbon agriculture subject by evaluating the carbon-based performance of an experimental design carried out on a farm in the Brazilian Savanna (Cerrado biome), in the state of Maranhão, Brazil. The experimental design comprised a total of 75 observations; three replications of five treatments (five production systems), repeated in five periods. We analyzed the data using univariate and multivariate approaches (ANOVA in the latter case) to explore the different characteristics of this experiment. We also defined a univariate measure of performance using data envelopment analysis models to aggregate the multidimensional response of the experimental design, given by the dynamics of soil carbon (carbon sequestration) and gas emissions (here, nitrous oxide and carbon dioxide).

We found a statistically significant interaction between treatment and time, meaning that responses to treatment vary with time. The results also showed a statistical significant effect between carbon stocks in soils and management of the agricultural areas.

The main national public policy aimed to face climate change, the Low-Carbon Agriculture Plus plan (ABC+ plan) recognizes that there are farmers with different performances. The challenge is to identify their degree of maturity in adopting agricultural practices based on the low-carbon agricultural technologies. The approach here proposed may contribute to this theme, as it allows the identification of the production strategy with the best performance.

KEYWORDS: Performance evaluation. Experimental design. Climate change.

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