

**TITLE:** MONITORING OF THE BIOLOGICAL QUALITY OF SOILS SUBMITTED TO TWO FERTILIZER INVESTMENT LEVELS

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**ABSTRACT:**

The development of agricultural technologies and their broad adoption by farmers have allowed expressive and constant gains in productivity over the last decades. However, the continued growth of agricultural production in a sustainable manner, without compromising the natural resources base, is the great challenge of our time. The objective of this work was to evaluate the biological quality of Cerrado soils cultivated with maize under two levels of technological investments in fertilization. Soil samples were collected from an experimental area of the Embrapa Milho e Sorgo cultivated with high yield maize hybrids under two levels of technological investments in fertilization, high or medium inputs. Soil enzymes involved in nutrient cycling (nitrogen and phosphorus) were used as bioindicators. The activity of arginase and urease was determined by the quantification of ammonium released into the soil after hydrolysis of arginine and urea, respectively. Acid and alkaline phosphatase activities were assayed by measuring the amount of p-nitrophenol released from p-nitrophenyl phosphate at pH 6,5 and pH 11, respectively. Results showed significant differences ( $p < 0,05$ ) among the activities of the enzymes involved in nitrogen cycling. Arginase and urease activities showed significant differences in both environments with medium or high technological investments for maize crop. However, plant genotype effects were observed for the arginase and urease activity. Arginase showed an average enzyme activity of  $22,0 \mu\text{g N-NH}_4^+ \text{ h}^{-1} \text{ g}^{-1}$ , approximately 10-fold lower than that of urease. Acid and alkaline phosphatase showed an average enzyme activity of  $3529,9 \mu\text{g p-nitrophenol h}^{-1} \text{ g}^{-1}$  and  $4556,4 \mu\text{g p-nitrophenol h}^{-1} \text{ g}^{-1}$ , respectively. No statistical differences in acid and alkaline phosphatase activities were observed between treatments. In conclusion, depending on the indicator used, it was possible to identify effects on the soil biological quality by using different levels of technological inputs for maize cultivation in cerrado soils. Among the enzymes analyzed, the activity of arginase was the most sensitivity indicator of soil health and quality.

**Keywords:** Technology, fertility, productivity.

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