Enzyme activity and correlations with soil attributes in integrated production systems in Western Amazon

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ABSTRACT: Soil enzymes are vital for nutrient cycling, driving organic matter decomposition and nutrient release crucial for plant growth. This study assessed betaglucosidase (BG), arylsulfatase (AS) and acid phosphatase (AP) activity in the 0-10 cm soil layer of seven cattle production systems located at Embrapa's experimental field in Porto Velho, Rondônia, Brazil. The pasture systems included integrated crop-livestock-forestry (ICLF), ILF, and pasture areas, and taking into account a native forest (NF) as control. Enzyme activities (EA) were compared using ANOVA and Tukey's test, and correlated with soil chemical and physical attributes using Spearman's correlation. Few significant differences for EA were observed among systems. ILF and Ipyporã pasture showed the highest BG activity, followed by Urochloa humidicola pasture and NF, which were similar to the integrated systems. ICLF showed the lowest AP activity. Soil organic matter (SOM) positively correlated with the three EAs. AP and AS activities were significantly correlated ($\rho=0.373$). Also, they correlated more strongly and positively with moisture (AP$\rho=0.604$ and AS$\rho=0.276$) and negatively with available P (AP$\rho=-0.530$ and AS$\rho=-0.243$). BG correlated more strongly and positively with Mg ($\rho=0.425$) and negatively with aluminum saturation ($\rho=-0.317$). These results highlight the sensitivity of soil EA to specific soil attributes and pasture variety.

Keywords: BioAS, Fertbio, silvopastoral systems, soil quality, sustainable agriculture