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40.17-P: Extensive analyses for pasture biophysical and biogeochemical dynamics under the interactions between human and soil types in Rondônia

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Pastures play a crucial role in sustainable development in the Amazon. Although many studies have characterized pasture condition and degradation in the Amazon, our understanding of Amazonian pastures is still limited to plot and local scales.

We have conducted biophysical and biogeochemical analyses of pasture processes at local and regional scales in the state of Rondônia by integrating many pasture sites under different soil types and management practices. Our primary objective is to understand the dynamics of pasture biophysical and biogeochemical properties and their link to management and soil types.

Sixteen pastures in Rondônia, extending from Porto Velho to Presidente Medici, were selected for biogeochemical characterization. For eleven of the sixteen sites, pasture biophysical analyses were also conducted. These sites vary by soil type (oxisols, ultisols, and alfisols), age (6-10, 11-15, and more than 16 year-old), and management (i.e., property size, animal density and rotation). Pasture biophysical parameters included live and dead above ground biomass (AGB) and LAI.

Soil biogeochemical parameters included exchangeable cations, available phosphorus, and base saturation.

Field surveys showed that biophysical and biogeochemical parameters decreased as a function of pasture age, but above 11 years-old the differences between the age classes became very small. Pasture biophysical measures changed with grazing intensity as well. For example, pasture AGB was strongly correlated with grazing intensity ($R^2=0.91$), with lower AGB found in small (25 - 60ha) and medium (240 - 600ha) properties with high grazing intensity and higher AGB occurring in large ranches (3500 - 6300 ha) with lower grazing intensity. Soil biogeochemical analyses showed that alfisols had the highest soil fertility even after more than 20 years of land use, followed by ultisols and oxisols. However, available phosphorus reached similar levels among these soil types after 11 years. Despite variation in soil biogeochemistry over the study sites, modified in part by soil type and pasture age, no significant relationship was observed between soil fertility and biophysical properties. Overall results indicate that in Rondônia, pasture management (i.e., intensive and extensive) may affect pasture productivity more strongly than soil types.