Adsorption and forms of phosphorus in Oxisols: influence of mineralogy and use

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The aim of this study was to verify the influence of mineralogy and former soil use on adsorption and forms of P in Brazilian Latosols (Oxisols). In order to include a wide range of contents of hematite, goethite, kaolinite (Ka) and gibbsite (Gi), we used five soils (cohesive Yellow Latosol, dystrophic Yellow Latosol, acric Red Latosol, and two dystroferric Red Latosols, one developed from gabbro and one from tuffite), never cultivated and already cultivated, in adjacent areas, during long periods, receiving liming and phosphated fertilization periodically. Physical, chemical and mineralogical characterizations were performed, involving: particle-size-distribution, Fe in less crystalline forms (Fe_o), free oxides (Fe_d) and "total" (Fe_t) forms, beyond P fractionation and availability. P adsorption was studied using 24 h of shaking and concentrations of 0, 5, 10, 25, 50, 75, 100 and 200 mg kg^{-1}, for obtaining the adsorption isotherm from which it was obtained the maximum capacity of P adsorption. Using x-ray diffraction analysis, mineralogical composition of Fe-free and Fe-concentrated clay fractions were obtained and, through differential thermal analysis, Ka/(Ka+Gi) ratio in the Fe-free clay fraction. As the mineralogy of the Latosols becomes more oxidic, P adsorption, total P and the forms more strongly linked to Fe and Al increase. The cultivation differentially influenced P adsorption and increased the forms of P linked to Ca in all the soils. Less labile P forms predominate in the studied Latosols, with emphasis on the organic ones associated with humic compounds in the non-cultivated soils and to the inorganic ones linked to Fe and Al in the cultivated soils.

Keywords: phosphorus sorption, phosphorus fractionation, mineralogy, Latosol (Oxisol)