

B-44: Phosphate retention by Sri Lankan soils and its relationship to soil pH, CEC and exchangeable calcium

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Retention of phosphorus involves both adsorption and precipitation reactions. Since these processes occur simultaneously, there is uncertainty regarding the main mechanism of P retention. Precipitation of calcium phosphate following cation exchange reactions that displaced exchangeable calcium, has been reported even in acidic soils. The objective of this study was to investigate the relationship between CEC and exchangeable calcium on P retention in acidic Sri Lankan soils.

Nineteen surface samples were collected from different locations of Sri Lanka. An adsorption experiment was conducted by equilibrating soils with increasing P concentrations added as KH_2PO_4 and measuring the solution P after equilibration. Langmuir isotherms were plotted and adsorption maxima were calculated for all soils.

In almost all soils, Langmuir isotherm fitted well with the data set. Adsorption maxima ranged from 274 - 992 mg P/kg soil. Conformity to Langmuir isotherm is believed to indicate that retention is mainly due to adsorption. However, if concentration of 1 ion species is limiting, precipitation also could be described by Langmuir equation.

When all soils were considered, CEC or exchangeable calcium did not show a significant relationship with P retention. But in soils with pH 5, multiple regression analysis indicated a significant relationship (0.77^{**}) with CEC and exchangeable calcium. This was not observed in soils with pH < 5. The results indicate that in soils with pH > 5, precipitation of calcium phosphate may have occurred, following cation exchange reaction which displaced exchangeable calcium by potassium added as KH_2PO_4 .