Phosphorus Adsorption Pattern in Selected Cocoa Growing Soils in Nigeria

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Abstract

Application of phosphate fertilizer for the correction of P deficiency in soil is ideal in agricultural practices. Unfortunately, only a small fraction of applied P fertilizer is available for plant uptake due to fertilizer-soil interactions which leads to fixation of P. phosphorus adsorption isotherm and buffering capacity are strong tools for predicting response of different soil types to applied P fertilizers. The study was carried out to investigate the degree of P adsorption capacity in selected cocoa soils in Nigeria. Owena, Ibadan and Ikom soils were equilibrated with solutions of 20, 30, 40, 50, 60, 70 and 80 mg P L^{-1} prior to evaluating sorption capacity and binding intensity. Result indicated that at any specific P concentration, adsorbed P was higher in Ikom soil than Owena and Ibadan soils. Langmuir equation gave better goodness-of- fit than Freundlich equation. The soil's ability to sorb added P increases due to increase in clay, aluminium and iron content. Hence, Ikom soil with the highest clay, Al and Fe will require more phosphorus fertilization to attain optimum phosphorus concentration in soil solution compared with Owena and Ibadan soils. However, Ikom soil will serve as the best reservoir of phosphorus due to its high P-buffering capacity.

Keywords: Fertilizer, Freundlich, Langmuir, Isotherm, aluminium, clay

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