

SORPTION ISOTHERMS FOR EVALUATING  
PHOSPHORUS REQUIREMENTS OF SOILS AND RESIDUAL  
EFFECTS OF FERTILIZER PHOSPHORUS

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AUGUSTINE S. NZABONA-NTUMA

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## ABSTRACT

Sorption isotherms were used to evaluate phosphorus (P) requirement and residual effects of P on 7 soils representing different soil types in Kenya.

Preliminary studies indicated an equilibration time of 10 days. Soils demonstrated diverse P sorption capacities. Gituamba (a humic Andosol) sorbed the most (5,357  $\mu\text{g P/gm}$ ) and Mtwapa (an orthic Ferralisol) a sandy soil (88% sand) sorbed the least P (380  $\mu\text{g P/gm}$ ). Sorption capacity was better related to the Tamm Al content of the soils. Isotherm displacements clearly demonstrated residual effects of P on N.A.L. (a humic Nitosol) and Gituamba soils. At N.A.L., P had been applied 6 years before the study.

Yields of Serena sorghum (Sorghum vulgare Pers) on N.A.L. soil (70% clay), demonstrated residual effects of P and was 90 to 95% of maximum at 0.075 ppm P in soil solution. Yield on the sandy Mtwapa soil (88% sand) did not reach maximum at 2 ppm soil solution P, although P extraction methods (Olsen, Bray I and Bray II) indicate adequate P levels. For Gituamba soil yield of sorghum was too poor to allow for meaningful discussion of the results probably due to detrimental soil acidity effects in this soil.