

ABSTRACT

The phosphorus status of some Jamaican soils was investigated by studying the sorption of P by and the desorption of P from the soils, the Chang and Jackson P and the Olsen's available P fractions and the labile P fraction.

Level of P sorption in the soils was, in order of parent material: acid shale soils > hard white limestone soils > old alluvial soils > recent alluvial > soft white and yellow limestone soils.

Amorphous and ammonium acetate extractable Al were indicated as the major cause of P sorption and fixation.

Phosphorus was found to attack clay minerals during this fixation process, 1:1 layer silicates being attacked to a greater extent than 2:1 layer silicates.

After an extended period of contact between the soils and P, there was some transformation of crystalline and ammonium acetate extractable Al and Fe into amorphous Al and Fe.

Removal of Al and Fe from clays by various reagents was found to result in some reduction in P sorption, the extent of which was proportional to the level of amorphous Al and Fe removed.

The level of P sorption was found to vary in various cationic systems. Thus the following order in increasing levels of P sorption:- $\text{Na}^+ < \text{K}^+ < \text{NH}_4^+ < \text{Ca}^+$.

Calcium silicate, oxime (8-hydroxyquinoline), EDTA and ammonium fluoride were found to be effective in reducing the level of P sorption.

Calcium silicate and oxime effected large increases in the

level of P desorbed from some of the soils studied.

Calcium silicate effected significant increases in the level of Olsen's available P in phosphated soils, enhanced response of the crop to residual P, and some decreases in the P requirements of the soils.

P added to the soils was fixed mainly in the Al-P fraction, the least of the fixed P being incorporated in the Ca-P fraction (except in calcareous soils).

The Al-P fraction of the soils was indicated as the most important contributor to crop P uptake, with Ca-P being the more important fraction in calcareous soils.

Estimates of the labile pool of P in the soils studied were found to account for more of the variations in crop response to native and added P, than were estimates of Olsen's P or the P requirement (level of added P necessary to establish a soil solution P concentration of 0.2 ug P/ml). Levels of Olsen's P were in turn of greater value than the P requirement in predicting crop P response to native and added P.