

ABSTRACT

Conventional methods including sonic vibration, sodium-hexametaphosphate treatments and pH adjustments proved to be unsuccessful in dispersing Montreal and Boetica clays, two Caribbean Andepts in St. Vincent and Dominica respectively. However,  $Zr(NO_3)_4$  solution was found to be ideal for this purpose and its validity was demonstrated using the pipette and centrifuge methods of particle size analysis. Mechanical composition of the two soils showed that they contained high amounts of organic matter and sand but clay content of the Montreal soil was less than half that of the Boetica soil. The textures deduced from particle size analysis did not agree with those noted in the field.

Cation exchange capacity variations were obtained using varying strengths of leaching solution, different pH levels and differing leaching techniques. Cation exchange capacity increased with increasing strength of leaching agent and increasing pH, but decreased when water was used prior to alcohol for leaching of soluble cations. Cation retention was therefore largely due to non-coulombic surface adsorption and to a less extent to coulombic (electrostatic) forces. Organic matter played a significant role in cation adsorption.

Studies in the laboratory showed that K and  $NH_4$  release increased with increasing levels of K or  $NH_4$  applied at 30 per cent moisture content, and on air- and oven-dried samples, for low levels of K application. Ammonium ions did not greatly affect the release of K while K release tended to decrease as pH increased. Organic matter free soils fixed small quantities of applied K hence organic matter was the main source of release of K and  $NH_4$ .

Greenhouse studies showed that dry-matter-yield response to applied N and K were highly significant ( $p < 0.01$ ) as was the N-K interaction. Plant uptake of applied N was highly significant ( $p < 0.01$ ) while N uptake due to applied K was less significant ( $p < 0.1$ ). Uptake of applied K was highly significant ( $p < 0.01$ ) but uptake due to N and the N-K interaction were insignificant.