ABSTRACT

The development, control and effects on plant growth of acidity in two 'Cat-Clay' soils of the West Indies, i.e. Frederick clay of Trinidad and Mara clay of Guyana were investigated by laboratory equilibration studies and greenhouse experiments.

It was found that alternate wetting and drying increased acidity and influenced transformations of S, whilst flooding decreased acidity and removed a high proportion of mineralised S.

Liming and fertilizing with P effectively reduced toxic levels of Al and decreased the level of the S fraction in the soil.

The rate of reaction between soils and $CaCO_3$ or P was slow and up to six months, equilibrium was not attained for all treatments. The pH values increased steadily for increased rates of added $CaCO_3$ or P; extractable Al decreased correspondingly.

Both soils released S when incubated at room temperature ($30^{o}C$) in the laboratory. However, much more S was immobilized and released on using higher levels of $CaCO_3$ or P.

In greenhouse studies with maize (Zea mays), dry matter yield increased with the addition of $CaCO_3$ and P, Al toxicity being the main limiting factor to yield. In the control treatment, large amounts of Al were absorbed by the roots with very little being transported to the shoots and leaves. These plants were stunted with coralloid roots and died within two weeks. The plants that survived suffered from P starvation, except those on the Frederick clay that were treated with the higher levels of $CaCO_3$ and P.

Liming and the use of P fertilizer increased the uptake of Ca, whereas it reduced that of K; however, Mg uptake was not affected.

With the addition of N and high levels of P, the N content of the plants increased and Ca deficiency symptoms became evident. However, this treatment had no effect on the reaction of plants to Al toxicity.