

ABSTRACT

The effects of lime and P on the level of exchangeable AL and its toxicity to plants in three acid Trinidad soils were investigated by equilibration studies and greenhouse experiments. The soils were treated with levels of lime ranging between 0.1 and 12.5 T/A  $\text{CaCO}_3$  (from field pH to pH 8.0) and moist equilibrated for six months. Measurements of pH, exchangeable and extractable AL and available P were made at regular intervals.

It was found that liming effectively reduced toxic levels of AL in the soils and also increased available P. The rate of reaction between soil and lime was slow and after six months, equilibrium had not been attained. After two to three months pH declined steadily for rates of lime below 8 T/A and exchangeable AL increased correspondingly. Increase in available P was apparently due to organic-P mineralization. Lime requirement was calculated after six months equilibration.

Exchangeable AL in the soils was effectively reduced by applied P. Fractionation of added P (50-5,000 ppm) revealed that over 80% was fixed as AL- and Fe-P. The rate of P fixation increased with the level of added P as did the ratio of AL-P to Fe-P.

In greenhouse studies with cowpea (Vigna sp.) dry matter yield was increased 70-80% by the addition of lime and P; AL toxicity being the main limiting factor to yield. Nodulation was also favourably affected especially by P additions. Liming increased the uptake of Ca whereas it reduced that of K. Mg uptake was not affected. On the unlimed soils large amounts of AL was taken up into the roots of cowpea, but very little was transported to the shoot.