

ABSTRACT

Phosphorus applied as superphosphate at 22 and 44 lbs P per acre failed to increase the yield of cane in calcareous soils of Barbados, ranging in P content from 535 to 2527 p.p.m. and of variable available Olsen and Bray P status. However, increased uptake of phosphorus resulted in a Red Brown Soil following P fertilization but leaf phosphorus was depressed and in an Oceanic Soil juice sucrose was lowered.

In a pot experiment dry matter yields of sugar cane and phosphorus uptake were increased by applications of mono-ammonium and dicalcium phosphates supplying 44 lbs P per acre respectively, but leaf phosphorus was unaltered.

Fractionation of phosphorus in soils treated with large amounts of P in the laboratory using the Chang and Jackson procedure, revealed that most of the added P was retained in the aluminium and calcium forms in the Black Soil but mainly as iron and aluminium-P in the Red Brown Soil. The saloid-P showed some enrichment but this declined after two months incubation.

Over 80 per cent of the P retained could not be extracted by the Bray and Olsen reagents, particularly in the Red Brown Soil. However, Olsen and Bray values were related to P uptake by sugar cane but not to per cent response and were also related to native saloid-P, aluminium-P, while only Olsen values were related to iron-P.

P^{32} studies with maize indicated that greater uptake of fertilizer P resulted in the Black than in the Red Brown Soil when yields and uptake were significantly increased by 100 lbs per acre applied P. The pool of labile phosphorus was over 100 lbs per acre and it was concluded that the high P status of these soils primarily prevented yield responses to P fertilizer, although fixation in the Red Brown Soil restricted uptake.