

## ABSTRACT

The Scotland Clays of Barbados were found to be saline-alkaline soils with an Electrical conductivity of the saturated extract ( $EC_e$ ) exceeding  $5 \text{ mmhos cm}^{-1}$ , an Exchangeable Sodium Percentage (ESP) ranging between 20% and 40%, and soil pH varying between pH 8.0-8.5. At all levels of the profile, the Soluble Sodium Percentage (SSP) was 97%, with Na concentrations in the saturation extract exceeding  $50 \text{ me l}^{-1}$ .

High montmorillonite content, coupled with Na saturation, is responsible for the severely impeded drainage of these soils. Saturated hydraulic conductivities were of the order of  $0.010 \text{ cm hr}^{-1}$ .

Mulching of the soil surface, using sour grass, bagasse and poultry manure, in combination with applications of gypsum at  $10 \text{ tonnes ha}^{-1}$ , on a ridge and furrow system of cultivation, was shown to be an effective means of reclamation for Scotland Clays.

Applications of sulphur, at  $10 \text{ tonnes ha}^{-1}$ , although resulting in a considerable decrease in soil pH and significant reductions in the Sodium Absorption Ratio (SAR), did not prove to be effective for the reclamation of these soils, in the short-term, due to the large increases in soil salinity produced.

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Mulching, individually, and in combination with gypsum, produced a two-fold decrease in  $EC_e$ , reduced SAR and soil pH and resulted in more extensive root systems and greatly increased sugar cane yields. Surface soil temperatures beneath the mulches were up to 8 C lower and, especially during dry periods, soil moisture was considerably higher, than in the bare plots.

Gypsum applications produced a six-fold increase in the saturated hydraulic conductivity, improved soil structure and promoted deeper and more extensive rooting of the sugar cane.

Salt removal occurred, not in the classic manner of leaching downwards to lower levels of the profile, but rather, by upward movement under the capillary forces resulting from surface evaporation. The salts were deposited on the surface, from which removal was effected by the flushing action of subsequent rainfall.

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