ABSTRACT

The relation between sugarcane growth rate and soil-water deficit was obtained by the use of large, weighed, soil monoliths, in which the variety B49119 was grown. The growth/deficit curves, called "profile moisture-release" curves, agreed with results obtained in a field study. Field measurements and auxanograph records showed that, for a given soil-water deficit, growth rate was increased by small showers of rain at night or by cloudy periods during the day, and decreased as the root system aged.

Compared with the kandoid clay soils of equal depth, the smectoid soils held about twice as much water which was available to sugarcane before it stopped growing or before it died of drought. So-called "field capacity" depended upon the method used to determine it, especially in the deeper smectoid soils. Cultivation increased the water-holding capacity of the soils, the additional available water being released at a low tension. None of the soils had a capacity as high as a fabricated potting compost.

A 3-dimensional relation was obtained, for sugarcane growing in monoliths of different soil types, between transpiration rate, root density and soil-water potential. The importance of soil type in this relation appeared to be due only to the moisture characteristic of the soil and the limitation imposed on root growth. It was concluded that root densities measured in commercial fields frequently limit transpiration under Barbados conditions, especially as the crop ages. Cultivation of the monoliths increased root density but root densities in all the natural soil monoliths were inferior to those measured in the compost.