

Evaluation of the Fertility Status of the Unilorin Sugar Research Institute Farm

S.S. Afolabi

Sugar Research Institute
University of Ilorin
Ilorin, Nigeria.

ABSTRACT

Preliminary investigations into the native macro nutrient elements of the University of Ilorin Sugar Research Institute's farm was carried out in the cropping season 1984-85. Twenty samples were collected per hectare which were air dried, finely ground, sieved and bulked. Five subsamples were taken for the final analysis. Characterisation of the soil include analysis for pH, soil organic matter and cation exchange capacity (CEC). The results of the macro-nutrient analysis revealed a moderate to adequate levels and suitable for sugarcane growth. None of the values for total nitrogen was less than 0.1 % and, therefore, considered moderate for sugarcane soils. However, the values obtained for potassium was found to be low.

INTRODUCTION

The Unilorin Sugar Research Institute's Farm is located at Bolorunduro village, about five kilometres away from the academic unit of the University. It covers an area of about 25 hectares. Presently about ten hectare is under sugarcane cultivation.

Soil analysis is carried out to get relevant information on the fertility status of the soil which does help in land use planning. Soil surveys can aid in predicting the behaviour and suitability of growing crops and in land use planning (Beater, 1959). Very few studies have been reported concerning sugarcane soils of the Unilorin Sugar Research Institute's farm (Obakin, 1978). There is, therefore, the need to evaluate the native nutrients of this area to guide future fertilizer recommendation policy. The objective of this work is to characterize and evaluate the native nutrient status in these soils to guide future fertilizer and land use planning in the farm.

MATERIALS AND METHODS

Sample Collection :

The farm was divided into four major groups (A, B, C, D) based on the topography of the area. Fifteen to twenty soil samples were taken per hectare to a depth of 20 cm. The samples were air dried, finely ground and sieved with a 2 mm sieve. The samples were then composited and sub-samples were taken for analysis.

Soil Analysis :

The pH was determined with a digital pH meter in both water and in KCl. Soil texture was determined using the hydrometer method of mechanical analysis (Boyoucos, 1951). The macroelements were determined according to the method reported by Black (1965). Soil organic matter was determined using the wet oxidation method by Walkley and Black (1934). The cation exchange capacity (CEC) was determined by saturating

the soil sample with sodium acetate and the adsorbed Na^+ ion was displaced with ammonium acetate ($\text{NH}_4 \text{OAC}$). The displaced sodium was determined on the flame photometer as a measure of cation exchange capacity as described by Jackson (1962). The total nitrogen was determined by the standard micro-kjeldahl method (Black, 1965). The phosphorous was determined using the perchloric acid digestion wet oxidation method. Potassium, calcium, sodium and magnesium were determined according to the methods described by Jackson (1962).

RESULTS AND DISCUSSION

The results show that the farm area is slightly acidic (Figure 1) and pH ranges from 5.6 to 4.95. This range of acidity has no deleterious effect on sugarcane because sugarcane is slightly acid tolerant. However, it is to be noted that the pH will decrease with increase in the use of some kind of fertilizers such as ammonium sulphate [$(\text{NH}_4)_2 \text{SO}_4$] and urea if no liming programme is practised.

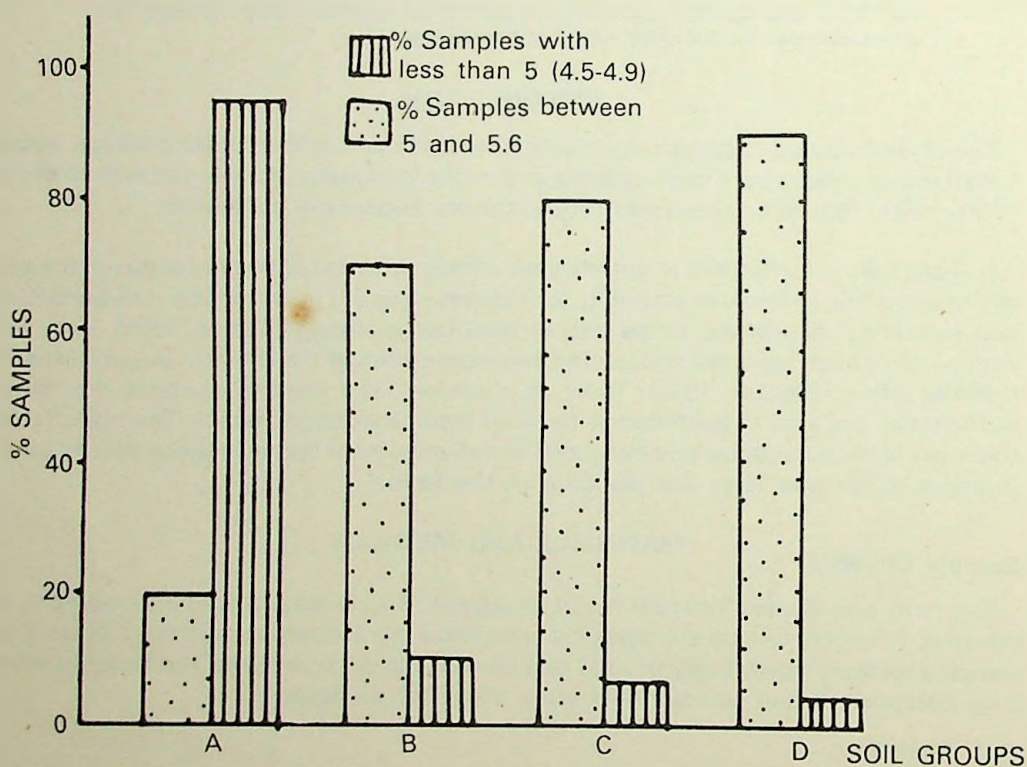


Figure 1. Fertility status of sugarcane soils : soil reaction or pH.

The particle size analysis suggests a fairly regular distribution of soil separates in the region (Table 1).

Table 1. Physical and chemical analysis of soil.

Soil group	CEC meg/100g Soil	Sand (%)	Silt (%)	Clay (%)	Textural class
A	16.17	62.4	28.0	9.6	Sandy loam
B	8.58	80.4	14.0	5.6	Loamy sand
C	8.58	80.4	14.36	5.2	Loamy sand
D	8.33	80.4	14.0	5.6	Loamy sand

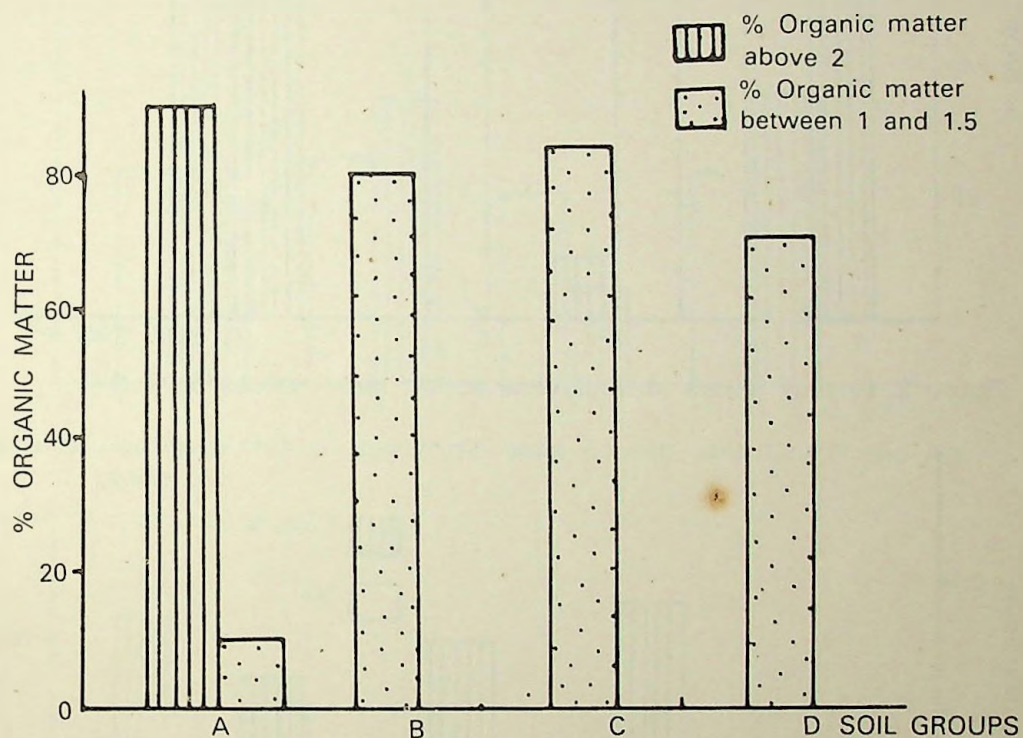


Figure 2. Fertility status of sugarcane soils : Organic matter.

The texture of the soil ranges from sandy loam to loamy sand having medium to low organic matter (Figure 2). The lower portion of the field receives high silt due to flooding. This area supports luxurious growth even during the dry months of the year.

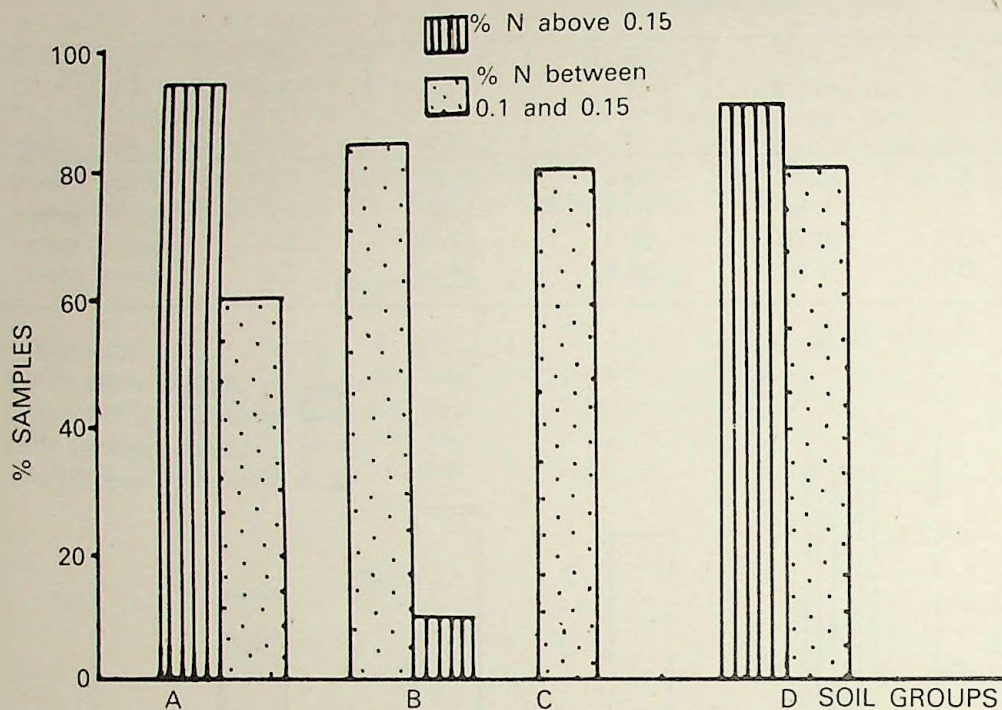


Figure 3. Fertility status of sugarcane soils : mean values of % N.

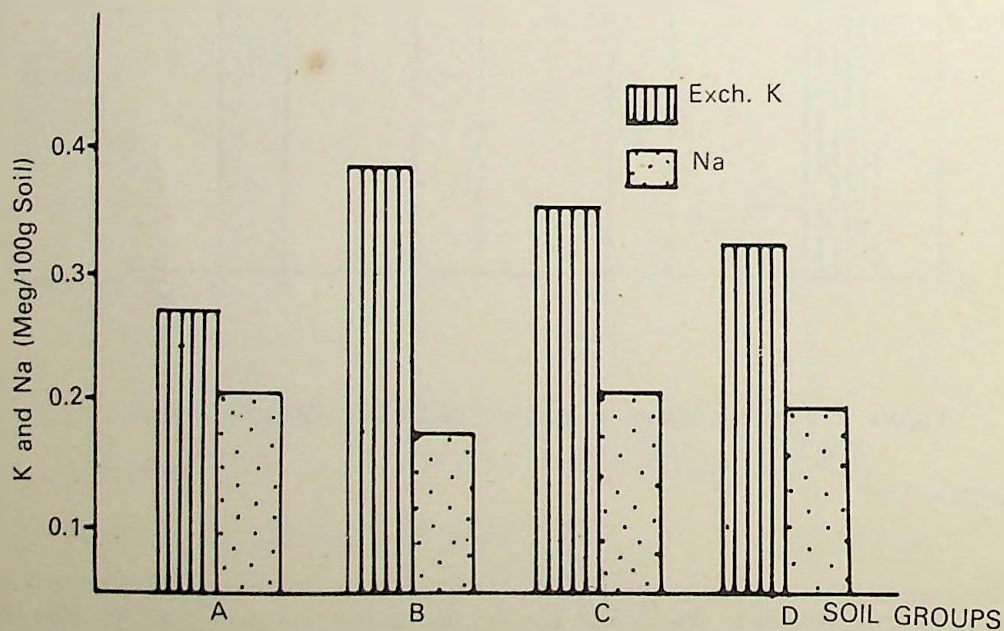


Figure 4. Fertility status of sugarcane soils : mean values of Na and K.

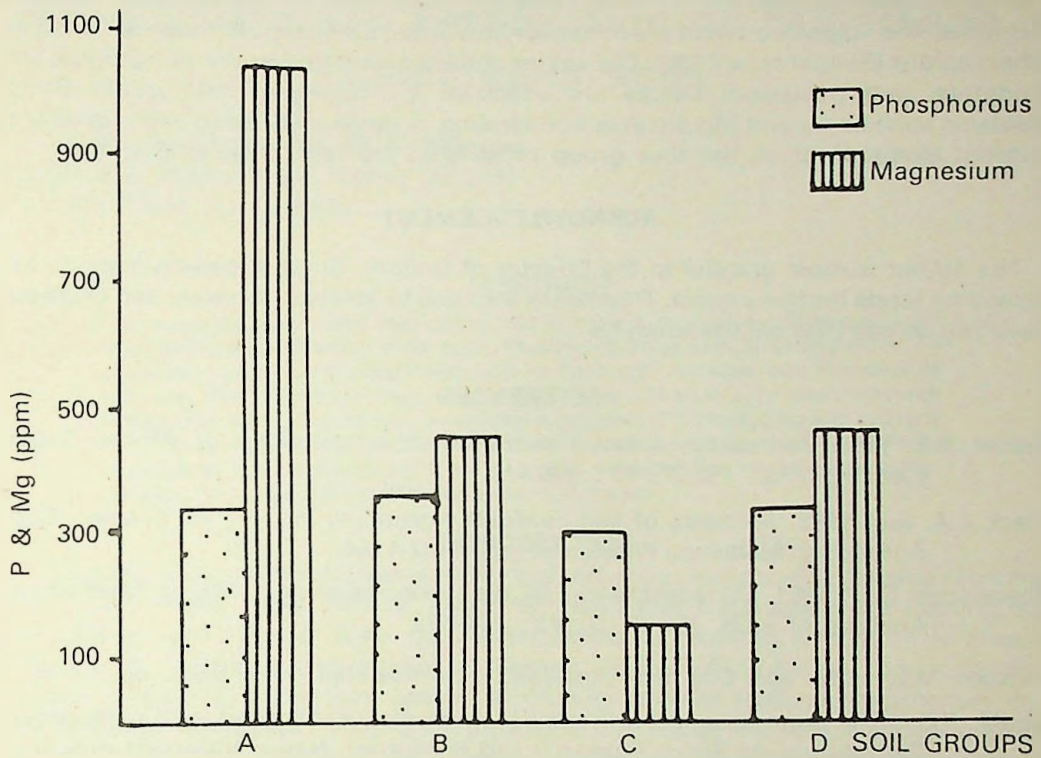


Figure 5. Fertility status of sugarcane soils : mean values of P and Mg (ppm).

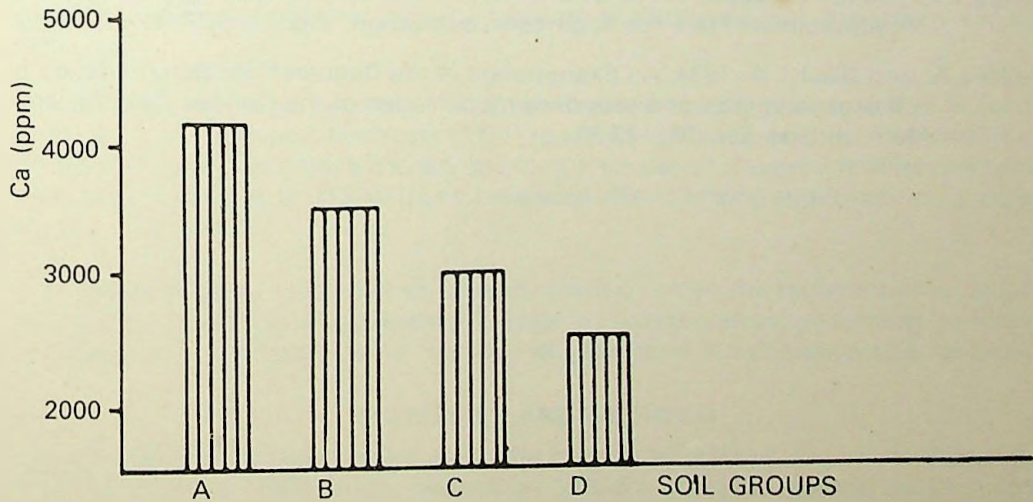


Figure 6. Fertility status of sugarcane soils : mean values of Ca (ppm).

The CEC values suggest slightly favourable exchange sites for the available nutrient elements. The values obtained are, however, low when compared to those obtained in other regions (Sehgal *et. al.* 1980). The values obtained for nitrogen and phosphorus are moderate, and potassium values are adequate for sugarcane production. Other elements such as Ca and Mg are also non-limiting. A general variation exists in all the nutrient elements of all the four group of soils of the farm (Figures 3 to 6).

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