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Utilising soil nutrient analysis from Nicaragua as a local cocoa grower’s guide

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Abstract

In this study, we conducted a comparative analysis of various soil samples from Nicaragua, ranging from native rainforest to cocoa plantation areas. Physico-chemical analyses were performed to assess the levels of soil NPK nutrients in soils that are either native or affected by previous land use. The objective of the analysis is to determine and guide the selection of cultivation areas, as well as identify soil amendment requirements. To achieve this, six samples were analysed for their texture and NPK composition.

The different concentration levels of nitrogen, phosphorus, and potassium present in the samples were correlated with observations of cocoa cultivation. For soils where cocoa is growing well, NPK levels of 7758, 109, and 1316 mg kg⁻¹ were measured, whereas soils with poor cocoa growth exhibited NPK values of 4697, 12, and 15461 mg kg⁻¹. The observed decrease in nitrogen and phosphorus levels, accompanied by an increase in potassium levels, appears to influence fruit formation on cocoa trees. The pod formation was sampled from cocoa trees of the same hybrid and compared between “well and poor suited soils, confirming the soil composition results by showing a growth deficit of nearly 50 percent for the poorly suited soil. It was observed that soil texture, along with NPK concentrations, provided valuable insights for establishing cocoa cultivation and determining appropriate agricultural practices. In comparison to non-cultivated soil (NPK: 11991, 135, and 9539 mg kg⁻¹) or native rainforest soil (NPK: 11565, 168, and 2303 mg kg⁻¹).

In conclusion, it was found that the characteristics of Nicaraguan soils directly affect the yield of cocoa cultivation. Understanding these parameters enables the implementation of best practices to enhance soil fertility and promote sustainable, high-quality production.

Keywords: Cocoa, soil analysis, soil fertility