Influence of Slope and Depth on Soil Chemical Properties in an Oil Palm Plantation

O.O. Olubanjo and F.U. Maidoh

Abstract

A study was carried out in a 28-year old Oil palm (Elaeis guineesis) plantation established on a gently sloping terrain in NIFOR Benin, Nigeria to determine the geo-spatial distribution of soil chemical properties as influenced by slope position and depth and also the assess the relationship between soil chemical properties with slope and depth. A line transect was delineated along the slope of the selected plantation. The line transect was 45 m long and 45 m wide. It was divided into three equal slope segments namely, Summit, Mid and bottoms slope respectively. Each slope was further sub-divided into three (3) quadrants measuring 15 m x 15 m making a total of nine (9) plots. The slope of the study area was determined from the topographic map generated using a graphical plot of elevation against the measured distance. The slope was determined along each slope line distance 15 meters apart. A total of 72 samples covering four depths (0-15 cm, 15- 30 cm, 30-45 cm and 45-60 cm) were obtained using a soil auger. Each sampling point was geo-referenced using a GPS (global positioning system).Soil chemical properties (pH, O.C, N, P, Ca, Mg, K, Na, H) were determined in the laboratory using standard methods. The result of the statistical analysis revealed a significant difference ($P<0.05$) among the soil properties in different slope positions and depths. Major factors accounting for the variations in the soil properties studied were the slope position and soil depth. Slope position had a significant effect ($p<0.05$) on soil pH, N, Ca, Mg, K, H, ECEC. Soil depth significantly affected ($p<0.05$) all soil properties studied. IDW was used in generating the surface distribution maps in using Arc GIS 10.1. The findings revealed that slope and depth had a significant effect on the soil chemical properties studied

Keywords: Slope, Depth