Assessing Spatial Variability of Selected Soil Properties in Upper Kabete Campus Farm, University of Nairobi, Kenya

Heliyon

24 Pages • Posted: 11 Feb 2022 • Publication Status: **Under Review**

S.M Mwendwa
University of Nairobi

Joseph P. Mbuvi
affiliation not provided to SSRN

Geoffrey Kironchi
affiliation not provided to SSRN

Charles KK Gachene
University of Nairobi - Department of Land Resource Management & Agricultural Technology

Abstract

This study aimed to evaluate spatial variability of selected soil parameters as a smart agricultural technology guide to precise fertilizer application. A farm designated as Field 3 which is under Arabica coffee within a

Abstract

This study aimed to evaluate spatial variability of selected soil parameters as a smart agricultural technology guide to precise fertilizer application. A farm designated as Field 3 which is under Arabica coffee within a bigger Soil Mapping Unit (SMU) was selected for a more detailed soil observation at a scale of 1:5000. Soil samples were taken at depths of 0 to 15 and 15 to 30 cm across 20 sample locations in grids and selected properties analysed in the laboratory. Kriging interpolation method was used to estimate the accuracy of interpolation through cross-validation of the top soil parameters. In 0 to 15 and 15 to 30 cm depth, soil reaction, percentage organic carbon and percent nitrogen showed low variability of 5.1% and 5.8%, 10.4% and 12.7%, 14.5% and 17.6% respectively. Phosphorus was deficient in both depths and showed moderate variability of 36.2% and 42.3% in 0 to 15 and 15 to 30 cm respectively. Calcium and Magnesium ranged from sufficient to rich and showed moderate and low variability in top and bottom depths, respectively. All micronutrients were sufficient in the soil. The soils were classified as Mollic Nitisols. Results showed that soil parameters varied spatially within the field therefore, there is need for variable input application depending on the levels of these elements and purchasing of fertilizer blends that are suitable for nutrient deficiencies. Precision agriculture is highly recommended in the field to capitalize on soil heterogeneity.

Keywords: Smart agricultural technology, Spatial variability, Variable input application, Precision Agriculture, Soil heterogeneity

Suggested Citation:

Mwendwa, S.M and Mbuvi, Joseph P. and Kironchi, Geoffrey and Gachene, Charles KK, Assessing Spatial Variability of Selected Soil Properties in Upper Kabete Campus Farm, University of Nairobi, Kenya. Available at SSRN: https://ssrn.com/abstract=4032349 or http://dx.doi.org/10.2139/ssrn.4032349