

## **Application of Semivariogram Model to Quantify Spatial Variability of Soil Properties in a Forested Tropical Soil.**

Obidike-Ugwu E. O., Ogunwole J. O., Odunze A. C., Nwafor O. E. and Ariwaodo J. O.

### **Abstract**

Accurate evaluation of spatial variability of soil properties is one of the key components of ecosystem management. The conventional analytical and semivariogram methods were used to analyze data to quantify the potential of the semi-variogram model for measuring soil properties and their spatial variability in a tropical forest ecosystem. A total of 100 soil samples were collected through a 300 m traverse at 3 m intervals in a teak (*Tectona grandis* Linn. F) forest area of Kaduna State, Nigeria. Exchangeable bases ( $K^+$ ,  $Na^+$ ,  $Ca^{2+}$  and  $Mg^{2+}$ ), forms of iron (Feo, Fed and Fep), and SOC were estimated using standard methods. Conventional analyses showed a high coefficient of variation (36.34% - 90.83%) except for SOC which ranked medium (16.48%). The semivariograms of the exchangeable bases were fitted with the spherical model, Fed and TOC were fitted with the exponential model, and Feo and Fed were fitted with linear and Gaussian models, respectively. All of the properties had a more comprehensive sample size (range = 6.5 m – 177.100 m) than the sampling interval (3 m), subjecting the need to employ wider sampling spaces to reduce cost-effectively and save time. These observations suggest that soil properties are spatially variable and should not be ignored. Assuming uniform value for soil properties based on conventional theories and practices can lead to mismanagement. Results indicate semivariogram model potentials to represent spatial variability of studied soil properties. However, further work is needed to map out the studied areas based on the variability of soil properties and to understand better factors controlling spatial variability of soil properties.

**Keywords:** Semivariogram, Forested Tropical Soil