

Application of a Two-Phase Sampling Approach to Determine Soil Spatial Variability in Relation to Nutrient Dynamics

N. Domburg, C.A. Marriott, and G. Hudson

Macoulay Land Use Research Institute
Craigbuckler
Aberdeen AB15 8QH
Scotland, UK
e-mail: n.domburg@mluri.sari.ac.uk

Information on the spatial pattern of major nutrients and organic matter is important when studying soil-plant relationships. Variability of soil total C, total N, and pH in a grazed, fertilised sward was quantified using combined nested sampling and grid and transect sampling (Marriott et al., submitted). This approach implies collection of data on separate occasions. The nested sampling suggested an increasing variance for total C at the plot scale, i.e. a linear variogram. For the other soil properties most variation occurred over distances less than 15m. The pattern of the variation was further investigated by taking samples along three transects with points separated by 0.33m and on a 5m grid. Spherical variograms could be fitted for total N and pH using all sample sets after standardizing the data to remove the non-spatial component of temporal change. The described survey, for which samples were collected a year apart, focused on quantifying spatial variation. However, since some properties of interest are related to microbial activity and plant growth, temporal (seasonal) variation may be expected. Approaches for studying both spatial and temporal variability with the same sampling effort are discussed. Instead of sampling intensively on three occasions, smaller data sets could be collected throughout the year allowing analysis of the deterministic (temporal) component of variation related to microenvironmental factors. Better understanding of this deterministic component can be used to improve the method of standardization of the data sets for spatial analysis.