

Spatial Heterogeneity of Soil Texture and Organic Carbon Concentration Within a Map Unit of Wet-Zone, Sri Lanka

U.W.A. Vitharana^{1*}, P. D. B. J Palihakkara¹, P.D. Rubasinghe¹

*¹Department of Soil Science, Faculty of Agriculture, University of Peradeniya,
Peradeniya 20400, Sri Lanka*

**uvithara@pdn.ac.lk*

Chloropleth maps are the source of soil information for land use planning and soil management. However, the accuracy of soil information derived from these maps are rarely known. This study investigated the prediction accuracy and spatial variability of two soil properties, i.e., texture and organic C(OC), in the map unit of Mawanella-Kandy-Kiribathkumbura complex (416 km²) of the wet-zone soil map (scale 1:250,000). Surface (0–30 cm) soil samples were taken at 72 locations identified on the basis of spatial distribution of elevation and slope and were analyzed for soil texture and OC concentration. Predicted values of surface soil texture and OC from the map were derived by fitting spline models to soil profile data. Soil analysis revealed that a considerable spatial heterogeneity of clay (5.5-44.4%), silt (0.7-26.9%), sand (41.4-81.1%) and OC (0.3–1.9%). One sample t-test revealed that a significant difference ($P < 0.05$) between soil properties predicted by the map and field measurements. Map predicted two soil textural classes namely, loamy sand and sandy clay. Soil analysis revealed that five textural classes namely loamy sand, sandy loam, sandy clay loam, sandy clay and clay. Soil textural distribution is moderately controlled by the slope ($r = -0.3$ for clay) and precipitation ($r = 0.3$ for sand). Variograms revealed that a strong to moderate spatial structures. The range values of variograms indicated an extent of spatial correlation from 103 m (sand%) to 465 m (silt%). The strong to moderate spatial structure allowed to produce accurate maps of soil textural fractions and OC with a distinct spatial pattern. A large but spatially structured variability of soil texture and OC was found within the studied mapping unit. However, this variability is poorly represented by the choropleth map. Therefore, upgrading existing choropleth map using novel digital mapping techniques is a requirement for supporting land use planning and sustainable soil management.

Key words: Choropleth soil maps, Digital soil mapping, Prediction accuracy, Spatial variability