Time-efficient and Accurate Texture Analyzing Method for Tropical Soils

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Soil texture refers to the relative percentages of the primary particles in soil. It is an important property for studies in plant nutrient retention, hydrology, leaching, erosion and other processes. Texture analysis involves separation of aggregates into single grains by dispersing primary particles followed by fractionation. Among different methods of analyzing soil texture, pipette method is considered as the most accurate. However, lengthy pre-treatment procedures of pipette method are considered as a main reason for the laborious nature of soil texture analysis. This study compares two variants of pipette method in view of selecting a time-efficient method without compromising the precision and accuracy of assessment. The International Soil Reference and Information Centre (ISRIC) method involves a lengthy pre-treatment procedure which assures a better accuracy and precision. Comparatively, the Kellogg Soil Survey Laboratory (KSSL) method is less time and chemical consuming. Thirteen soil samples representing a range of soil textural composition were analyzed using both procedures. Coefficient of variation (CV) values of sand (0.22), clay (0.42) and silt (0.44) of KSSL method were similar to the CV values of sand (0.19), clay (0.47) and silt (0.33) of ISRIC method indicating comparable precision of the KSSL method. Pearson correlations analysis revealed high correlations for sand (0.99), clay (0.91) and silt (0.72) measured using two methods indicating strong resemblance of analytical results. A very low root mean square error (sand 4.4%) of KSSL method further indicated similarity of analytical results. This was further shown by two sample T-test results with no significant difference ($p<0.05$) between average sand, silt and clay percentages of two methods of soil texture analysis. Therefore, the KSSL method can be recommended as a time and cost effective method over the ISRIC method for soils of Sri Lanka for analyzing texture.

Keywords: ISRIC method, KSSL method, Pipette Method, Pre-treatment, Soil texture analysis