



“Gheorghe Asachi” Technical University of Iasi, Romania



COMPARISON OF PARTICLE-SIZE ANALYZING LABORATORY METHODS

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Abstract

Particle size distribution is one of the most influential factors of most soil physical and even some soil chemical characteristics. As modern measurement techniques are being introduced, the need for comparing new methods with older methodologies arises because comparability means data continuity. Here, three institutes conducted a comparison of particle size measurement among the laser, areometer and pipette techniques. The purpose of the comparison was to a) discover any differences among operators, laboratories, and techniques; b) identify if there were any differences and if they could be linked to soil type (e.g. high clay, loam, or sand content) or particle size range; and c) understand if the laser diffraction method gave results that were significantly larger than the other methods of any size fraction.

There was no statistically proven difference between the two operators examined based on the pipette method's result. The comparison of two of the institutes' pipette methods showed statistically significant differences for three of the eight samples tested. However, these differences only seemed to appear in the 0.01 mm to 0.02 mm particle size range. A technical comparison among all three methods resulted in significant differences in all cases except for one sample that had very high sand content and very low clay content. Finally, the laser diffraction method was analyzed to see if it measured a larger amount of the clay fraction, however, it instead overestimated the silt and the fine sand (0.01 mm to 0.02 mm) fraction, not the clay fraction.

Therefore, we conclude that different methodologies can provide significant difference in particle-size measurement. Based on the results, we recommend creating a widely accepted patent for sample preparation (disaggregation, the use of peroxide or other agents, using ultrasonic or other methods) and for measuring techniques (a set of refractive and sorption indexes, using ultrasonic during the measurement, pump speed etc.).

Key words: areometer, laser diffractometry, pipette method, soil fractions

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