Determination of Soil Aggregation Indices as a Function of Tillage Systems, Crop Rotations, Sampling Depth and Sampling Preparation

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Soil aggregation can be determined through the MWD (Mean Weight Diameter), the GMD (Geometric Mean Diameter) and through the AS% (Aggregate Stability Index). These three indices have different physical meaning: the MWD is large if the soil has a high percentage of large aggregates; the GMD is an estimate of actual dominant size class; and the AS% index is a measure of total aggregation and does not consider aggregate size class distribution. When detemining soil aggregation indices in heavy clayey oxisols the correct preparation of the soil sample is fundamental to obtain good results. In addition, the type of sample preparation may interact with the type oftreatment (for example, conventional or no-tillage system), and the result may be an overestimation of aggregation indices, and sometimes underestimation. The objective of this paper was to verify the changes in aggregate stability using two soil sample preparations: passing them through a 4 or an 8 mm sieve before the wet sieving procedure. This was tested in soil samples collected from an experiment in the 14th year of duration. Main treatments were two tillage systems (conventional and no-tillage) and three crop rotations (soybeans/wheat/soybeans, com/wheat/corn, and soybeans/wheat/corn). Soil samples were also taken at two depths: 0-10 and 10-20 cm. The soil of the experiment was a Typic Haplorthox (Distrophic Red Latosol) located at IAPAR's experiment station in the State of Parana, Southern Brazil (between 22° 29 30" and 26° 42' 59" of south latitude and between 48° 02' 24" and 54° 37' 38" of longitude west of Greenwich). The aggregation indices determined were the MWD, GMD and the AS%. Climate (Keoppen system) in the experiment place was Cfa. The results showed that MWD, GMD and AS% in No-Tillage systems were significantly higher than in Conventional Tillage. Crop rotations that included corn had higher aggregation indices. Depth of sampling had significant effects (5% level) on MWD and AS% data and soil sample preparation had also asignificant effect for MWD (at 1% level) and GMD (at 5% level). Although aggregation indices were not all significant at the 1% level, the double interaction between tillage systems and depth of sampling, tillage systems and soil sample preparation. and depth of sampling and soil sample preparation were all significant at the 1% level. Also the triple interaction no-tillage x soil sample preparation (8 mm sieve) x 0-10 cm depth had a significantly higher MWD at 5% level. Since these indices are determined in our laboratory in aroutine analysis, the method of soil sample preparation had been changed to using the 8 mm sieve, to better estimate the size of soil aggregates in our soils.

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