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Natural Resources Research Update

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Title: Carbon and nitrogen pools in soil aggregates separated by dry and wet sieving methods

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Soil aggregation influences conservation and mineralization of C and N but aggregate separation method may influence levels of aggregate size distribution and quantification of C and N pools. Aggregate size distribution and soil organic C (SOC), soil total N (STN), particulate organic C and N (POC and PON), microbial biomass C and N (MBC and MBN), potential C and N mineralization (PCM and PNM), NH_4-N, and NO_3-N concentrations in aggregates separated by dry and wet sieving methods were compared. The PCM, PNM, MBC, and MBN are considered as active pools, SOC and STN as slow pools, POC and PON as intermediate pools, and NH_4-N and NO_3-N as available pools. Aggregate separation was made in soil samples from 0 to 5 and 5 to 20 cm depths with various properties and cropping systems in the northern Great Plains. Aggregate amount was higher in dry than in wet sieving in the 4.75-2.00 mm size class but the amount was higher in wet than in dry sieving in the 2.00-0.25 mm class in all sites, except Sidney. In cultivated soil, no definite trends in C pools in aggregates were observed between sieving methods. In no-till grassland soil, C pools were higher in dry than in wet sieving in the <0.25 mm but the trend reversed in the >2.00 mm fractions. In all fractions, active and available N pools were 2- to 30-fold higher in dry than in wet sieving, probably due to loss of water soluble N during wet sieving. Both C and N pools, except active C pools, in aggregates were usually higher in the <0.25 mm than in the other fractions, regardless of sieving methods. Aggregate size distribution and C and N pools determined by dry and wet sieving were well correlated, except for active N pools. Dry sieving of moist soil (water content around 25% field capacity) can be used as a rapid and reliable method of separating soil aggregates for determining C and N pools compared with wet sieving which reduces microbial activities and N mineralization due to the destruction of physical habitat of microbial communities in aggregates and excludes water soluble C and N pools (Sainju, 2006).

Sainju, U.M. 2006. Carbon and nitrogen pools in soil aggregates separated by dry and wet sieving methods. Soil Science 172:937-949.

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