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Changes in soil aggregate fractions, stability and associated organic carbon and nitrogen in different land use types in the Loess Plateau, China

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Rational land use can enhance soil nutrient sequestration and control erosion, but the mechanisms of the ecological restoration on soil aggregate-associated carbon and nitrogen are still not well understood. A large-scale ecological restoration program was launched in the Loess Plateau during 1990s. The ecological restoration programs involved converting slope farmland to forest, grassland, shrub land and terrace. We studied their effects in relation to slope land as control on soil aggregate structure and stability, and their associated organic carbon and total nitrogen contents to 60 cm soil depth in the Loess Plateau. Our results indicate that the restoration practices reduced soil aggregate fragmentation, increased soil structure stability and transformed micro-aggregates into small and large aggregates. Comparing with the soil aggregate >0.25mm in slope land, the amount of that in forest, grass land, shrub land and terrace increased by 71%, 66%, 46%, and 35%, respectively, which improved soil health overall. The mean weight diameter (MWD) of aggregate indicated that soil aggregate stability (SAS) increased and soil hydraulic erosion resistance improved. In conclusion, ecological restoration directly or indirectly affected SAS through the influence of soil organic carbon (SOC) and total nitrogen (TN) in different soil layers. The results would provide a scientific basis for soil quality control and rational use of land resources.