



Stabilization/destabilization of soil carbon and nitrogen in intensively managed loblolly pine stands

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Forest management can have a strong influence on soil carbon and nutrient stocks. A study was initiated in 2005 to examine the potential to increase above- and below-ground carbon and nutrient stocks of loblolly pine ecosystems through the incorporation of forest slash into the soil. The treatments included differing amounts and qualities (i.e., C/N) of material incorporated into the soil. A component of this study includes predicting the longevity of any potential increases in carbon and nutrients in the soil. By sequentially separating soil organic matter into fractions of increasing density, a profile of stabilized carbon and nitrogen emerges. Soil organic matter fractions with lower densities are more labile and transient than higher density fractions. Plots with incorporated forest slash are compared to plots with no slash incorporation to detect any shifts in the total carbon and nitrogen in the different density fractions. Shifts in carbon and nitrogen to higher density soil organic matter fractions indicate a relative stabilization effect whereas; shifts to lower density fractions indicate a destabilization effect. The longevity of carbon and nitrogen will be directly dependent on the density of the fractions. Higher density fractions will persist for several hundreds of years, intermediate fractions will persist for decades to hundreds of years, and low density fractions will be relatively labile, persisting for only a few years. Carbon and nitrogen from the incorporated slash will be assimilated into different fractions and will be confirmed by measures of the mean residence time (MRT) of the density fractions. A decrease of the MRT of the density fractions, as compared to those on the untreated plots, will provide insight as to where the additional carbon and nitrogen is going.