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Soil aggregation and recalcitrant carbon pools in a Florida silvopasture system.

The focus on carbon (C) sequestration in soils has led to an increased interest in agroforestry systems based on their perceived ability to enhance the process. The extent and mechanisms of C incorporation into recalcitrant soil pools in these systems are, however, not adequately understood. Separating the organic matter (OM) in the soil into aggregate OM (AOM) that holds the majority of recalcitrant C and free particulate OM (POM) that breaks down more quickly can give a good indication of long term C storage in the soil. This study compared soil C pools and aggregation in silvopasture and adjacent open pasture fields on Spodosols in Florida. The macroaggregate sized fraction (2000 to 250µm) in the soil was broken up by sonication into AOM (that passed through a 250µm sieve after sonication) and POM (that did not pass through). The AOM for the whole soil was significantly higher in the silvopasture site near the tree, 6.63 g/kg, compared to silvopasture alleys (in the middle of tree rows), 3.70 g/kg, or open pasture, 3.69 g/kg. In addition, across the three management practices, the AOM content (percent of total OM in the macroaggregate) increased with soil depth: 58.6% at the 0 to 5cm vs. 83.1% at the 75 to 125cm. The results suggest that soils under and near the trees, compared with away from or devoid of trees, store higher amounts of AOM (recalcitrant C), and tree incorporation in land-use systems could enhance soil C sequestration.