End of cycle root samples and soil respiration in Virginia Piedmont site

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ABSTRACT: Carbon emissions from soil come from two identified pools, autotrophic and heterotrophic respiration. Methods to separate autotrophic and heterotrophic respiration have been developed, but exact contributions of each source to total carbon emissions are not confirmed. The purpose of this study is to explore the relationship between root biomass and soil respiration partitioning coefficients (the contribution of soil organisms to soil respiration). The study took place at a Piedmont site in Meherrin, VA with predominantly clayey soils. Using two different treatments (fertilized and unfertilized), with four replications installed in different seasons we were able to test a selection of variables on soil respiration. Soil respiration was measured over time at shallow and deep collars in an attempt to eliminate root biomass effects on carbon emissions. The deep collars were 35cm long PVC tubes while the shallow collars served as control resting on the surface. Soil samples were collected from each collar when measurements were completed. Course and fine roots were separated from the soil and weighed to determine biomass. Total root biomass was greater in fertilized plots; fine root biomass was greater in unfertilized plots. Root biomass showed no effect for summer, fall, and winter respiration measurements on fertilized plots but had a negative effect on the partitioning coefficient on the unfertilized winter plots. Given that fine roots are branched for absorption, finding more fine roots in unfertilized plots was expected. However, the negative trend on unfertilized winter plots was unexpected and may be attributed to human error. Replicating this study is recommended before reaching final conclusions.

KEYWORDS: carbon, soil respiration, root, root biomass, fertilized