

Soil Research

Andrew Lee

Introduction: Sixty soil samples to a depth of 75 centimeters were collected during the summer of 2008 in the forests at James Madison's Montpelier, in Orange County Virginia. Thirty samples were collected across a ten-acre compartment in an intermediate, mixed-species stand established on abandoned agricultural land around the First World War. An equal number of samples were collected in the adjacent Montpelier Landmark Forest, which is more than 300 years old and rapidly approaching old growth status.

Rationale statement: The purpose of this research is to compare organic matter and herbaceous cover in respective upper-Piedmont soils in Northern Virginia.

Questions: Researchers hypothesized that soil in the intermediate stand will have lower carbon content by weight. Also hypothesized is that old growth soil horizons will be more developed or “thicker”. Lastly, researchers expect to observe greater herbaceous diversity in the old growth stand. Simply stated, researchers asked how much carbon is in both? More specifically, they asked what differences can be observed in carbon content, depth to organic horizon, and are these correlated with understory diversity?

Methods: Two ten-acre compartments with similar features were selected for sampling. One compartment was located in the intermediate, mixed-species stand and the other in the Montpelier Landmark forest. Data were collected at 30 soil plot points in each compartment

equally spaced using a 1.8x1.8 chain grid (118.8ft x 118.8ft) oriented to cover the pre-selected compartment. Woody and non-woody herbaceous cover were measured in four mil acre plots (4.36 ft radius) established 10 feet from the soil plot center at cardinal directions. A bucket auger was used to collect soil sample cores. Cores were 75 cm and extractions were placed on a tray to gauge depth and determine depth of the O, A, and B horizons. Cores were then placed in gallon size plastic bags and labeled. Once dried, core samples will be individually weighed, burned, and weighed again to gauge carbon content. Herbaceous and carbon results will be described and analyzed for statistically defensible differences.

Expected results: Researchers expected that Landmark soil would have higher amounts of carbon due to age, resulting in a well-established organ horizon which adds carbon to the soil system. An anecdotal synopsis of field observations suggests the Landmark stand has deeper and more variable soil horizons, while the demonstration samples are relatively consistent within the same slope positions. Additional anecdotal results imply that carbon levels will likely be higher in the Landmark stand. On the other hand, researchers expected that the mixed-species, intermediate stand would have less herbaceous diversity due to a shorter forestation period. Field observations, however, suggest the mixed-species, intermediate stands have greater diversity due to the greater availability of sunlight.