

SOIL PHYSICAL CHARACTERISTICS OF LOBLOLLY PINE DECLINE SITES IN CENTRAL ALABAMA

INTRODUCTION

Loblolly decline has been linked to the presence of soil fungal pathogens whose infectious capabilities may be enhanced by specific soil conditions. Soil conditions related to poor internal drainage and insufficient nutrient content have been cited as potential causal factors in the promotion of pathogen infection. Soil physical conditions related to bulk density and total soil porosity have not been extensively evaluated in sites hampered by loblolly decline but may provide important information on soil physical conditions associated with loblolly decline.

OBJECTIVE

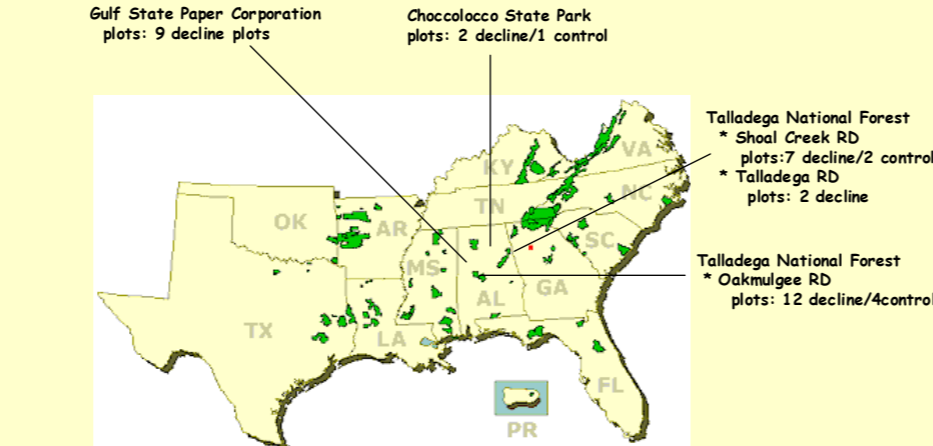
The purpose of the study was an evaluation of soil physical properties associated with loblolly pine decline and compare with soil data from plots determined to be uninfected (control).

STUDY PARAMETERS

Soil sampling was conducted in sites located on federal, state, and private industrial lands selected by Forest Health Monitoring (Pineville, LA) personnel. Plots were located within four major physiographic regions of Alabama. Four soil cores approximately 0.60 m (24 inches) in length and 0.05 m (2 inches) in diameter were removed from each plot (39 total plots) and each core subdivided into 0.10 m (4 inch) increments to analyze for bulk density and total porosity. Soil material from each depth increment was composited for particle size analysis.



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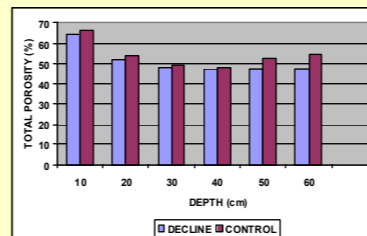
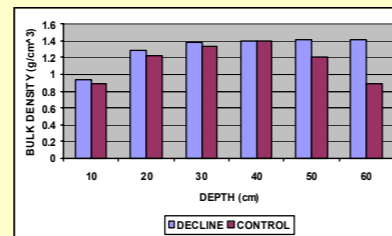
PIEDMONT *
A dissected geologic surface developed on igneous and metamorphic rocks. Soils possess clayey or loamy subsoils, thermic temperature regime, a udic moisture regime, and kaolinitic, mixed or oxidic mineralogy.

VALLEY & RIDGE *
A series of parallel ridges and valleys underlain by faulted and folded rocks. Soils are well drained, strongly acid, highly leached and have a clay enriched subsoil. They are shallow on sandstone and shale ridges to deep in valleys and on limestone formations.

COASTAL PLAIN *
A geologic surface underlain by sedimentary rocks that dip 20 to 40 feet every mile. Soils have a thermic temperature regime, udic soil moisture regime and are deep with a loamy or sandy soil surface underlain by a loamy or clay subsoil.

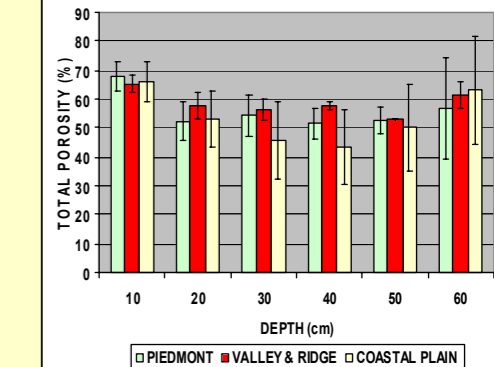
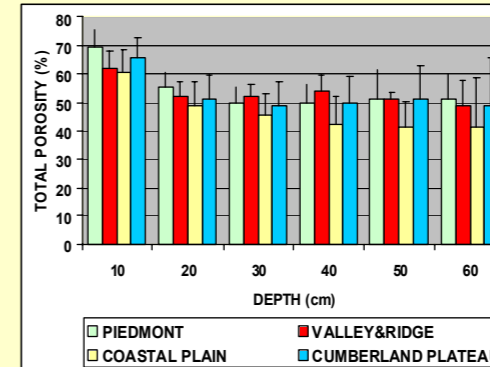
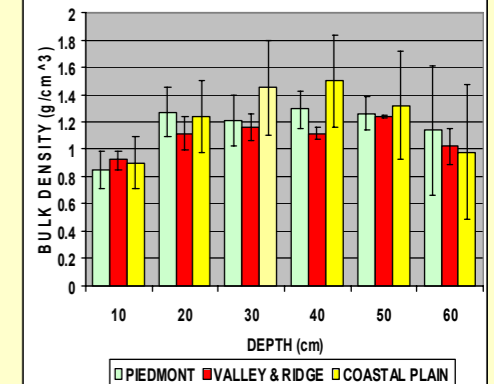
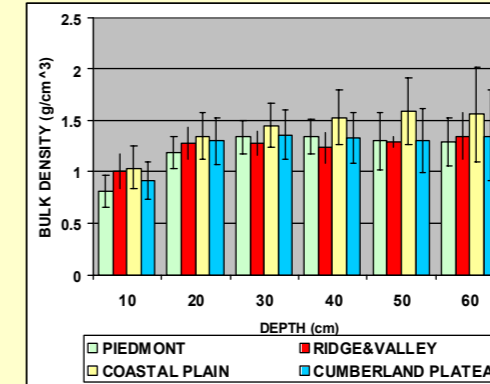
CUMBERLAND PLATEAU *
A dissected upland underlain by rocks approximately 300 million years old. Soils are medium to fine textured with a mesic temperature regime, udic soil moisture regime, with mixed or siliceous mineralogy.

PIEDMONT	VALLEY & RIDGE	COASTAL PLAIN	CUMBERLAND PLATEAU
1-5, 8-11 C1, C3	6-7 C2	12-22, 32 C4-C7	23-31



Bulk density levels were generally higher in plots that exhibited decline symptoms, especially in subsurface layers below 40 cm (16 inches). Concomitant with increased bulk density is a reduction in total porosity as evidenced by total porosity values in decline sites. Overall, bulk density and total porosity values did not exhibit levels indicative of growth limiting conditions.

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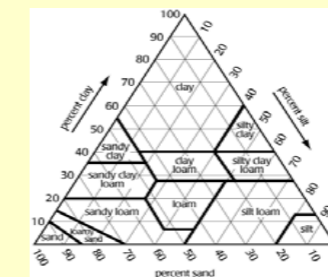
Bulk density increased with depth in samples collected from each region with the highest bulk densities associated with the Coastal Plain samples. This would be expected due to the greater weights associated with the sandier textures typical of the Coastal Plain. Bulk density of control plots were lower at each depth increment compared to the decline plots within each region, especially in Coastal Plain samples. Total porosity would be expected to exhibit similar trends as bulk density.

SURFACE 0 - 10 CM

PIEDMONT	VALLEY & RIDGE	COASTAL PLAIN	CUMBERLAND PLATEAU
SANDY LOAM - 1,2,8,11,C1 LOAM - 3,4,10 SANDY CLAY LOAM - 9 SILT LOAM - C3	LOAM - 6,7 SILT LOAM - C2	SILT LOAM - 12 SANDY LOAM - 13,15-17,32 LOAMY SAND - 14,18-22	SANDY LOAM - 23-31

SUBSURFACE 10 - 20 CM

PIEDMONT	VALLEY & RIDGE	COASTAL PLAIN	CUMBERLAND PLATEAU
SANDY LOAM - 1,2,5,8,C1 SILT LOAM - 10,11,C3 LOAM - 3,4 SANDY CLAY LOAM - 9	CLAY LOAM - 6,7 SILT LOAM - C7	SANDY LOAM - 12,13,15-17 19-22, C6 LOAMY SAND - 14,18,32, C7 SANDY CLAY LOAM - C5	LOAM - 23 SANDY LOAM - 24-31



Soil textural characteristics did not appear to differ between surface and subsurface soil layers. Soil textures were higher in clay content in Piedmont and Valley & Ridge sites, as would be expected. Coastal Plain and Cumberland Plateau sites were more coarse in texture and were dominated by sandy loams and loamy sands.