SUMMARY

Forest soil scientists and resource managers are being called upon to develop criterion and indicators to assess productivity losses and sustainability of forestry practices. Single criteria as well as integrated approaches are being evaluated for their potential to determine if current forest management practices are damaging the land base and potential productivity. Researchers have developed several good conceptual models, but testing these models is still in the early stages.

Our study measured compaction effects on four different soils and tree species. The interactive effects of soil texture, organic matter content, mineralogy, particle size distribution and other physical properties determined the degree of compaction on each of the four soils examined in this study. Furthermore those differences, in turn, affected properties such as soil strength, porosity and air water balance. Multiple regression growth models described root length density as a function of bulk density and water content, but the general model was only applicable to two of our soils. At high bulk densities, aeration was limiting at the wettest water contents, while strength was limiting at the driest water contents for three of our soils. However, the response varied with soil type and species.

The varied response to compaction and the subsequent affects on root growth that were both soil and species dependent showed that site-specific indicators and criteria are needed to accurately assess potential productivity declines. The actual value of our models will depend on their applicability to field conditions. The LLWR, in conjunction with soil and species specific data, will enhance our ability to determine overall potential loss of productivity due to compaction.
LITERATURE CITED


Eavis, B.W. 1972. Soil physical conditions affecting seedling root growth. I. Mechanical impedance, aeration and moisture availability as influenced by bulk density and moisture levels in a sandy loam soil. Plant Soil 36:613-622.


VITA

Cristina Siegel-Issem was born May 31, 1965 in Lubbock, Texas to Donna and Charles Siegel. She received a B.S. in Soil Science from California Polytechnic State University, San Luis Obispo in 1990. From 1990 to 1996 she worked as a soil scientist for the U.S. Forest Service Pacific Southwest Research Station in Redding, California. She currently resides in Bent Mountain, Virginia with her husband Robert and son Andrew.