

INTENSIVE UTILIZATION OF HARVEST RESIDUES IN SOUTHERN PINE PLANTATIONS: QUANTITIES AVAILABLE AND IMPLICATIONS FOR NUTRIENT BUDGETS AND SUSTAINABLE SITE PRODUCTIVITY

Mark H. Eisenbies^{a,*}, Eric D. Vance^b, W. Michael Aust^c, and John R. Seiler^c

^aU.S. Forest Service

^bNational Council for Air and Stream Improvement Incorporated

^cVirginia Tech Department of Forestry

The rising costs and social concerns over the use of fossil fuels have resulted in increased interest in and opportunities for biofuels. Biomass in the form of coarse woody residues left on site following traditional timber harvest in the southeastern United States constitutes a potentially significant source of biomass that could be utilized for bioenergy. Questions remain regarding whether the removal of this material would be a sustainable silvicultural practice given the potential impact on soil nutrient cycling and other ecosystem functions. Our objective is to use published studies to estimate quantities of residual materials that may be available as a source of bioenergy or biomaterials following harvest of southern pine forests. Quantities of nutrients potentially removed with the residues and their potential replacement with fertilizer are calculated, and a more general assessment of the implications of residue removals on sustainable productivity across a range of sites conducted. Generally between 50 and 80 Mg/ha of material are left on site after typical stem-only harvests, of which half could be removed using chippers at the landing. Based on these estimates, increase in mid-rotation fertilization rates of 45 to 60 percent may be needed on some sites to fully replace the nutrients removed for bioenergy. Field experiments show that residue removals do not degrade forest productivity in many cases, but more data are needed to assess the effects of frequent removals (i.e., from short-rotation systems) over long time periods and to identify sites that may be particularly sensitive to the practice. Markets for previously nonmerchantable materials also may provide incentives for improved forest management by landowners.

KEY WORDS: fertilization, forest soils, harvesting residues, sustainability

*Corresponding author: U.S. Forest Service, Box 9681, Mississippi State, MS 39759; Phone: (662) 325-8983; Email: meisenbies@fs.fed.us