HYBRID ASPEN GROWTH RESPONSE TO SHEARING IN MINNESOTA: IMPLICATIONS FOR BIOMASS PRODUCTION AND CARBON SEQUESTRATION

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Recent interest in the use of woody biomass for energy has created an opportunity for the development of silvicultural systems that can produce high levels of biomass over shorter rotations than traditional approaches to plantation management. One area within this arena where there is a great deal of potential is the management of short-rotation hybrid aspen. In particular, early successional hardwood tree species, such as those in the *Populus* genus, typically exhibit rapid initial height and diameter growth, making these species ideally suited for short-rotation forestry applications aimed at maximizing biomass production over short time scales. In many cases, greater levels of early growth have been achieved through the use of aspen hybrids (*Populus tremuloides* Michx. × *P. tremula* L.), which are crosses between quaking aspen (*P. tremuloides*) and European aspen (*P. tremula*). In addition to the rapid growth of these hybrids, the prolific root sprouting ability of this species presents potential management options for the production of woody biomass using coppice methods after initial plantation establishment. Moreover, the use of existing aspen root stocks as sources of regeneration for subsequent rotations provides a silviculturally straightforward and cost-effective means for sustaining these systems over multiple short rotations. Finally, the expansion of aspen root systems with each subsequent rotation provides a long-term opportunity for increasing belowground carbon storage on these sites. Here we present the results of a 15-year study investigating the growth response of hybrid aspen clones to shearing on upland sites in northern Minnesota. We describe specific clonal responses in terms of sucker density and early diameter and height growth. In addition, we use these findings to evaluate potential silvicultural options for managing these systems and their implications for carbon storage and biomass production for energy.

KEY WORDS: hybrid aspen, *Populus*, carbon sequestration, biomass production, growth and yield

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