Genetic Analysis in *Populus* Reveals Potential to Enhance Soil Carbon Sequestration

In a paper published in the August, 2005 issue of Canadian Journal of Forest Research, scientists from Oak Ridge National Laboratory provide insights into the genetic mechanisms that control rates and magnitudes of carbon transfer and turnover in plants and soil. These authors are among the first to suggest that regions of the genome could be harnessed to enhance the natural capacity of plants and soils to sequester carbon, thus mitigating rising carbon dioxide concentrations in the Earth's atmosphere. Incorporating information derived from this study into a model shows that increasing biomass distribution to roots and altering tissue chemistry to favor long-term pools of soil organic matter could enhance the rate of global carbon sequestration by an estimated 0.35Gt carbon/year. This represents ca. 4% of global carbon emissions.

Scientists reached this conclusion by assembling an extensive above- and below-ground carbon inventory for more than 1000 hybrid poplar (*Populus*) trees. Field data collected over a three-year period were combined with a newly-developed genetic map to identify regions of the genome responsible for the distribution of dry mass to stems, branches, leaves, and roots. Results indicate that traits associated with distribution of dry mass were controlled by a small number of genes and that different genes controlled the above- and below-ground production of biomass. Such findings provide a glimpse into how fundamental knowledge gained through the basic biological sciences can address questions related to carbon management in terrestrial ecosystems.

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Reference:

Wullschleger SD, Yin TM, DiFazio SP, Tschaplinski TJ, Gunter LE, Davis MF, and Tuskan GA. 2005. Phenotypic variation in growth and biomass distribution for two advanced-generation pedigrees of hybrid poplar. Canadian Journal of Forest Research (in press).