Macro- and Micro-nutrient Concentration in Leaf, Woody, and Root Tissue of *Populus* Irrigated with Landfill Leachate

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Landfill leachate offers an opportunity to supply water and plant nutritional benefits at a lower cost than traditional sources. Information about nutrient uptake and distribution into tissues of *Populus* irrigated with landfill leachate helps increase biomass production along with evaluating the impacts of leachate chemistry on tree health. We irrigated eight *Populus* clones (NC13460, NC14018, NC14104, NC14106, DM115, DN5, NM2, NM6) with fertilized well water (control) (N, P, K) or municipal solid waste landfill leachate weekly during 2005 and 2006 in Rhinelander, Wisconsin, USA (45.6 °N, 89.4 °W). During Aug. 2006, we tested for differences in total N, P, K, Ca, Mg, S, Zn, B, Mn, Fe, Cu, Al, and Pb concentration in preplanting and harvest soils, and in leaf, woody (stems + branches), and root tissue. Other than N (*P* < 0.0191), leachate did not increase the soil concentration of elements relative to preplanting levels (*P* > 0.05). There was broad variation among genomic groups and clones for tissue element concentrations, along with clone-specific uptake for most elements. The concentration of N, P, K, Ca, Mg, S, B, and Mn was greatest in leaves and least in woody tissue, while that of Fe, Cu, and Al was greatest in roots and least in leaves and woody tissue. Overall, there was successful uptake of macro- and micro-nutrients without detrimental impact to tree health, which validated the use of landfill leachate as an irrigation and fertilization source for *Populus*.

Keywords: hybrid poplar, phytoaccumulation, *Populus deltoides*, *P. nigra*, *P. maximowiczii*, *P. trichocarpa*, waste management

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