

Phytoaccumulation of Sodium and Chloride into Leaf, Woody, and Root Tissue of *Populus* Irrigated with Landfill Leachate

Jill A. Zalesny^{*,1,2}, Ronald S. Zalesny Jr.¹, Adam H. Wiese¹, Bart T. Sexton³, Richard B. Hall²

¹*U.S. Forest Service Northern Research Station*

²*Iowa State University Department of Natural Resource Ecology and Management*

³*Oneida County Solid Waste Department*

Information is limited about the response of *Populus* to elevated levels of sodium (Na^+) and chloride (Cl^-). 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 Na^+ and Cl^- concentration in preplanting and harvest soils, and in leaf, woody (stems + branches), and root tissue. The leachate-irrigated soils at harvest had the greatest Na^+ ($P < 0.0001$) and Cl^- ($P = 0.0013$) levels. The irrigation \times clone \times tissue interaction influenced the distribution of Na^+ ($P = 0.0240$) and Cl^- ($P = 0.0073$). Clones exhibited elevated total tree Cl^- concentration and increased biomass (NC14104, NM2, NM6), elevated Cl^- and decreased biomass (NC14018, NC14106, DM115), or mid levels of Cl^- and biomass (NC13460, DN5). Tissue concentrations with leachate were 17 (Na^+) and 4 (Cl^-) times greater than water. Sodium and Cl^- levels were greatest in roots and leaves, respectively. The broad variation among genotypes for tissue Na^+ and Cl^- concentrations substantiated the need for extensive genotypic screening before deployment. Clones NC14104, NM2, and NM6 expressed the necessary economical (woody biomass) and environmental (uptake) response for managed experimental plantations.

Keywords: hybrid poplar, osmotic effects, *Populus deltoides*, *P. nigra*, *P. maximowiczii*, *P. trichocarpa*, salts, waste management

* presenting author:

Forestry Sciences Laboratory, 5985 Highway K, Rhinelander, WI 54501, USA

Phone: (715) 362-1111; Email: jzalesny@fs.fed.us

Posters, Exhibits, and CEUs

Two poster sessions are planned for the evenings of Sept 24 and 25. Student poster competition prizes and travel grants are provided through the generosity of ChevronTexaco and BP Corporation. **Send poster abstracts to:**

David McMillan

Natresco Inc,
dmcmillan@natresco.com
435-775-9250

435-882-1275 (fax)

Stand alone booths and tabletop exhibit are available. For information about exhibit space, contact:

Thomas Spriggs

CH2MHill,
thomas.spriggs@ch2m.com
813-874-6522, ext. 4156
813-874-3056 (fax)

CEUs and equivalents are available to conference attendees. For questions about continuing education credits through Kansas State University contact:

Peter Kulakow

Kansas State University
kulakow@ksu.edu
785-532-7239

Sponsors

International Phytotechnology Society
US EPA
Midwest Hazardous Substance
Research Center
Chevron Texaco
BP Corporation

If you have any questions about the Fourth International Phytotechnology Conference, or would like to submit an abstract go to www.phytosociety.org, or contact:

Conference Chairs

Steven Rock

U.S. EPA
Phone: (513) 569-7149
Email: rock.steven@epa.gov

Lee Newman

University of South Carolina
Phone: (803) 777-4795
Email: newman2@gwm.sc.edu



2007

Fourth International Phytotechnology Conference



Sept 24-26, 2007

**Adams Mark Hotel
Denver, CO**



International Phytotechnology Society