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

Jill A. Zalesny[*,1,2], Ronald S. Zalesny Jr.[1], Adam H. Wiese[1], Bart T. Sexton[3], Richard B. Hall[2]

[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*

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

* 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

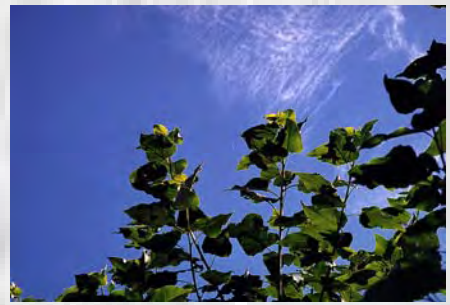
International Phytotechnology Society
US EPA
Midwest Hazardous Substance Research Center
Chevron Texaco
BP Corporation

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