

RESPONSE OF THREE *SALIX* VARIETIES TO IRRIGATION WITH DIFFERENT CONCENTRATIONS OF SOLVAY STORM WATER

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The production of soda ash, using the Solvay process, resulted in the creation of 600 ha of wastebeds near Syracuse, NY, over a 100-year period. Chloride leaching from the Solvay wastebeds into surrounding water bodies, including Onondaga Lake, is a concern. Storm water/snowmelt needs to be recycled onto an evapotranspiration (ET) cover on the wastebeds during the summer. To assess this, a greenhouse experiment was carried out. The experiment was a 6×3 factorial design with four replications. The first factor consisted of six treatments, five concentrations of Solvay storm water based on chloride concentrations ($8,000 \text{ mg Cl}^- \text{ L}^{-1}$ to $160 \text{ mg Cl}^- \text{ L}^{-1}$) and a control of tap water, and the second of the three varieties of shrub willow. The objectives were to 1) measure physical and physiological plant characteristics to determine which are stress indicators and to quantify the response of willow to storm water using these indicators; 2) assess the impact of storm water concentration on evapotranspiration and the difference between willow varieties; and 3) quantify the effects of willow variety on the uptake of calcium, magnesium, sodium, and chloride. Biomass accumulation, stomatal conductance (after 4.5 weeks), and evapotranspiration decreased for the treatments with the highest storm water concentration. Sodium concentrations for the highest treatment were 3 to 8 times higher for the leaves and 6 to 9 times for the shoots compared to the control, and chloride concentrations were 14 to 32 times for the leaves and 2 to 6 times for the shoots compared to the control. All willow varieties survived the 10-week experiment, but the willows that received the highest treatment showed signs of stress after 8 weeks. This experiment will assist in the design of an ET cover on the Solvay wastebeds and the potential for recycling storm water through shrub willows.

KEY WORDS: *Salix*, phytoremediation, Solvay wastebeds, salts

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