

## Effects of Irrigating Poplar Energy Crops with Landfill Leachate on Soil Micro- and Meso-fauna

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Increased municipal solid waste generated worldwide combined with substantial demand for renewable energy has prompted testing and deployment of woody feedstock production systems that reuse and recycle wastewaters as irrigation and fertilization for the trees. *Populus* species and hybrids (i.e., poplars) are ideal for such systems given their fast growth, extensive root systems, and high water usage rates. Maintaining ecological sustainability during such tree establishment and development is an important component of plantation success, especially for belowground faunal populations. We irrigated eight *Populus* clones (NC13460, NC14018, NC14104, NC14106, DM115, DN5, NM2, NM6) with fertilized (N, P, K) well water (control) or municipal solid waste landfill leachate weekly during 2005 and 2006 at the Oneida County Landfill near Rhinelander, Wisconsin, USA (45.6 °N, 89.4 °W). Trees were grown in a split plot design with eight blocks, two irrigation treatments (whole plots), and eight clones (sub plots). Trees were harvested for related studies in Aug. 2006. At that time, we collected three soil samples to a depth of 30 cm from each tree to test the effects of leachate irrigation on soil micro- and meso-fauna populations. Microfauna (e.g., mites, collembolans) were present in all clones, but their abundance varied among clones. Mesofauna (e.g., roundworms, larval coleopterans) were not nearly as common, but were found in all clones. Mesofauna were over four times more abundant in control trees than those receiving leachate. It is imperative that phytotechnologies allow for soil faunal sustainability, as upsetting this balance could lead to great reductions in the efficacy of the phytotechnology being deployed.

**Keywords:** environmental entomology, phytotechnologies, *Populus*, waste management, wastewater reuse

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