

IMPACTS OF PAPER SLUDGE, MANURE, AND FERTILIZER APPLICATION ON SOIL PROPERTIES AND BIOMASS PRODUCTION IN A SHORT ROTATION WILLOW CROPPING SYSTEM IN CENTRAL NEW YORK

Amos K. Quay^{a,*}, Timothy A. Volk^a, Sasha D. Hafner^b, Don J Leopold^a,
and Charles D. Schirmer^a

^aCollege of Environmental Science and Forestry, State University of New York

^bHydroQual, Inc.

Land application of organic wastes to short-rotation woody crops (SRWC) can reduce the environmental impacts associated with waste disposal and enhance biomass production. A complete understanding of the potential impacts of organic amendments, however, requires the examination of changes in soil characteristics and plant productivity to these amendments. This study was conducted to evaluate the response of shrub willow (*Salix × dasyclados*; SV1) to organic amendments in central New York, and to determine the impacts of the amendments on soil chemical properties. Treatments were applied in the spring of 2005 to two fields of SV1 at different growth stages. The older field was 1 year above ground on a 10-year-old root system, and the younger field was a regrowth after first coppice. The treatments were: 100 kg N/ha as urea (I), 100 kg total N/ha as dairy manure (ML), 100 kg available N/ha as dairy manure (MH), 100 kg total N/ha as paper sludge (S), 100 kg total N/ha sludge + 100 kg available N/ha of manure (SM) and Control (C). Generally there was no productivity gain due to organic amendment, nor did nitrogen-poor sludge depress yields. There was significant treatment effect on foliar Ca ($P = 0.03$) and S ($P = 0.03$) in the older field and significant ($P = 0.018$) negative effect on foliar P in the younger field. Other foliar elements were affected by fertilization. There was significant treatment effect on soil Ca, Mg, and pH ($P < 0.0001$, 0.007, 0.002, respectively) and marginally significant effect for organic matter ($P = 0.07$) in the older field. Soil Ca and pH were significantly ($P = 0.05$, 0.02, respectively) affected by fertilization in the younger field. The low response to N fertilization could partly be explained by the relatively high internal nutrient recycling of the fields and low levels of rainfall during the summer of the application year.

KEY WORDS: shrub willow, waste management, biomass production, *Salix*, organic amendment

*Corresponding author: State University of New York, College of Environmental Science and Forestry,
Department of Forest and Natural Resources Management, 1 Forestry Dr., Syracuse NY, 13210;
Phone: (315) 470-6775; Email: akquaye@syr.edu