Spatial Life Cycle Assessment (LCA) of Future Short-Rotation Willow Biomass Crops in 5 counties in Northern NY.

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Previous life cycle assessment (LCA) studies have demonstrated that short-rotation willow crops have the advantages of improving environmental sustainability by reducing greenhouse gas(GHG) emission and sequestering carbon on average in New York State. However, in order to have a more detailed estimation of environmental impacts of willow crops, a more spatially-explicit LCA is necessary. The objective of this study is to determine areas of potential willow biomass production in the northern NY, and to assess the site-specific environmental impacts of the production. First, potential suitable lands for growing willow biomass crops were delineated in tax parcels based on land cover classes, soil types, elevation, etc. in 5 northern NY counties, namely Jefferson, Lewis, Oneida, Oswego, and St. Lawrence. Second, potential biomass yield, transportation distance to end users, and land use conversion categories were estimated in tax parcels and the results were incorporated in LCA modeling process, and GHG and energy balance were reported on tax parcel level and mapped across the counties. The findings are critical to understand site-specific environmental impacts of potential willow biomass crops in future. In addition, the results are informative to guide future expansion of willow biomass crops for land owners and policy makers.

Key words: Willow Biomass, LCA, Spatially-explicit, environmental impacts.

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