

Hybrid Poplar Production Using Energy Performance Systems Injection Tree Planter

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Improving the efficiency of planting, tending and harvesting farm-grown trees was the goal of a project initiated by Energy Performance Systems (EPS) in fall 2005. The overreaching technical issue identified by EPS was that new equipment and systems needed to be developed to facilitate the production of high quality hybrid poplar biomass fuels in a sustainable manner at less than the cost of coal. Achievement of this goal required solving several technical challenges. The first challenge addressed by the project was to design and build a high-speed planting machine capable of establishing tree cuttings in untilled cropland with very accurate spacing. Associated challenges included finding good farmland that was not tilled, high-yield clonal material, and good quality cuttings. Also challenging was the process of identifying and applying best herbicides and other management practices for site preparation and weed control. Planting was done with the newly built EPS Injection Machine Planter in early June of 2007 on cropland formerly planted to corn or soybeans. Experienced hand planting crews also planted hybrid poplar at the same location with the same planting stock. The technique of “injecting” cuttings into the ground at high speed was proven to be successful, accurate, and non-damaging on both tilled and untilled cropland as long as the cuttings were > 3/8 inch diameter. Survival and growth results were similar for the machine and hand-planted sections of the field. Growth variation across the field was attributed to biological factors such as variation in soil characteristics, cutting quality, weather conditions, and grass competition. The desired machine planting speeds were demonstrated to be possible, but not achieved consistently due to materials failure. Field trial experience led to a re-design of the injector spring.

Keywords: Hybrid poplar, tree planting, planting machine, injection planting, cutting survival, tree growth.

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Lynn Wright is an Adjunct Faculty member of the Biosystems Engineering and Soil Science Department at the University of Tennessee, and sole proprietor of WrightLink Consulting. Previous work included nearly 30 years at Oak Ridge National Laboratory where she managed Woody Crops research for the U.S. Department of Energy's Biomass Program. She served as a U.S. representative to several International Energy Agency Bioenergy task groups between 1987 and 2003. Lynn is lead or co-author on more than 85 articles on the topic of bioenergy feedstocks, both woody and herbaceous, has contributed to a Biomass Energy Data Book available online, and maintains the website for the SRWCOWG (www.woodycrops.org). Current work includes supporting Energy Performance Systems in testing new equipment for hybrid poplar production in Minnesota and working with Oak Ridge National Laboratory staff to produce publications. The latest overview paper is: Wright LL, Eaton LM, Perlack RD and Stokes BJ (2012) Woody Biomass. In Sayigh A, (ed.) Comprehensive Renewable Energy, Vol 5, pp. 263-291. Oxford:Elsevier.