

DEVELOPMENT OF A WILLOW BIOMASS CROP HARVESTER BASED ON A NEW HOLLAND FORAGE HARVESTER AND SPECIALLY DESIGNED WILLOW CUTTING HEAD

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Willow shrubs have several characteristics that make them an ideal feedstock for biofuels, bioproducts, and bioenergy. They have been tested across the northeast and midwest United States and in Canada from Prince Edward Island to Alberta. The largest single cost factor for willow biomass crops is harvesting and transportation, which can account for up to 60 percent of the delivered cost of the biomass. The development of a cost-effective harvesting system that produces consistent sized chips has been a barrier to the deployment of willow biomass crops. SUNY's College of Environmental Science and Forestry has been working with Case New Holland and Cornell University for several years to develop an effective harvester system based on an FX-series New Holland forage harvester. A specially designed hydraulic driven willow cutting head manufactured by Coppice Resources Ltd. (CRL) in the United Kingdom has been fitted to the forage harvester for harvesting willow biomass crops. The FX45 forage harvester and modified cutting head were used during summer and winter of 2006. This combination was able to harvest 1.9-2.5 acres/hour with 70 percent field efficiency if stems were <3 inches in diameter and fairly uniform. Case New Holland fitted the CRL willow cutting head to a new FR-series forage harvester during fall of 2007 and after running trials they found that this series of forage harvester will be a more effective harvesting system than the previous FX forage harvesters. In limited trials (2007) with the FR forage harvester, harvesting rates of 3.6 acres/hour were reached. A forage blower was used to automatically unload a field forage wagon of willow chips into a chip trailer for road transport. Since fall of 2006 this method of transferring and transporting harvested chips has worked very successfully. The development of this willow harvesting system is helping to overcome barriers to the commercialization of willow biomass crops.

KEY WORDS: SRWC, biomass crops, willow cutting head, forage harvester

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