Development and Deployment of a Short Rotation Woody Crops Harvesting System Based on a Case New Holland Forage Harvester and SRC Woody Crop Header

Despite the projected increase in demand for woody biomass from short rotation woody crops (SRWC) and the wide array of benefits associated with their production and use, the expansion and rapid deployment of these systems has been restricted by their high cost of production and in some situations a lack of market acceptance because of poor quality chips from first generation harvesting systems. For willow and hybrid poplar SRWC, harvesting and delivering material to the edge of the field accounts for about 1/3 of the delivered cost of the biomass. Harvesting combined with the transportation of the material to and end user can currently account for 45-60% of the delivered cost of the biomass. Harvesting and transportation is also the second largest input of primary fossil energy in the biomass production system, after commercial N fertilizer, currently can account for about 1/3 of the input. Improvements in harvesting efficiency and handling logistics generated during this project will reduce the costs of harvesting and delivering woody biomass material to an end user compared to baseline costs prior to the start of this project.

Over the past four years the project partners have worked together to develop a single pass cut and chip harvesting system for SRWC that is based on an existing, commercially available forage harvester. Significant progress has been made, but the level of effort needs to be increased in order to meet the rapidly growing demand for woody biomass from SRWC systems and reduce harvesting and logistic costs.

The overall goal of this project is to build on existing collaborative efforts among the project partners (Applied Biorefinery Sciences, Case New Holland, Greenwood Resources, Mesa Engineering and Reduction, SUNY ESF, ZeaChem) to develop, test and deploy a single pass cut and chip harvester combined with a handling, transportation and storage system that is effective and efficient in a range of different short rotation woody crop (SRWC) production systems, environments and operating conditions across North America. The system will reduce the costs associated with harvesting and transportation, provide consistent quality material to meet end users specifications, and accelerate the deployment of SRWC for use in biorefineries. Our biorefinery partners will assess the quality of material produced, test batches of harvested biomass in their pilot facilities and provide feedback on the quality of the biomass that is produced. The project will address six specific tasks critical to attaining these goals, each of which has specific objectives.

Task 1. Develop, tune, test and deploy a single-pass cut and chip harvesting system that can be used in a range of willow and hybrid poplar cropping systems across the United States.

Task 2. Develop and refine one or more handling systems that will effectively and efficiently move SRWC chips produced with the harvester in Task 1 from the field to the end user.

Task 3. Monitor changes in wood quality for chips of different sizes, harvested at different times of the year, and stored under a variety of conditions.

Task 4. Assess and document the impact of harvesting improvements on the economics of SRWC feedstock supply systems.

Task 5. Go/No-Go Meeting

Task 6. Project Management and Reporting