

2013

Multi-pass Corn Stover Harvest Analysis and Storage Trials

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Recommended Citation

Darr, Matthew J., "Multi-pass Corn Stover Harvest Analysis and Storage Trials" (2013). *Iowa State Research Farm Progress Reports*. 1881.

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Abstract

In cooperation with DuPont Cellulosic Ethanol, the research team has conducted a large scale, multi-pass corn stover harvest on ISU Research Farms and the ISU Ag 450 Farm. Research conducted through the 2012 harvest was concentrated around modifications for the improvement of shredder performance in throughput and stover quality. The modifications were relayed to the commercial harvest crews who modified their machines to improve stover quality and harvest rate efficiency.

Keywords

RFR A12130, Agricultural and Biosystems Engineering

Disciplines

Agricultural Science | Agriculture | Bioresource and Agricultural Engineering

Multi-pass Corn Stover Harvest Analysis and Storage Trials

RFR-A12130

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Introduction

In cooperation with DuPont Cellulosic Ethanol, the research team has conducted a large scale, multi-pass corn stover harvest on ISU Research Farms and the ISU Ag 450 Farm. Research conducted through the 2012 harvest was concentrated around modifications for the improvement of shredder performance in throughput and stover quality. The modifications were relayed to the commercial harvest crews who modified their machines to improve stover quality and harvest rate efficiency.

In addition to research conducted with shredders, research was also conducted with balers. Efforts were concentrated around increasing baler pickup efficiency by making modifications to the baler pickup, which were developed on ISU Research Farms fields and transferred to commercial operators during the fall harvest. In addition to this research, analysis was completed for increasing density of bales in the field. By increasing the density of the bales, cost reductions can be achieved in the biomass supply chain to a processing facility.

Materials and Methods

Harvest. Stover was harvested from 1,100 acres of ISU fields at a harvest rate of 1.8–2 tons per acre for 3,000 bales total. Bales were delivered to various research farms and moved into storage trials at the BioCentury Research Farm.

Storage. Corn stover bales harvested from the ISU Research Farms were moved to the BioCentury Research farm and put into long-term storage trials. The trial length will be eight months total with the bales remaining in the storage trial the entire test period. Treatments for the storage trials were: tarped storage or covered storage in a hoop building. Bales were weighed and cored prior to entering the storage trial to obtain the initial weight and moisture content of the bale. On conclusion of the storage trial, the bales will again be cored and weighed to determine the dry matter loss of each storage treatment.

Results and Discussion

Tests conducted at the research farms concentrated on machine adaptations and settings that were then transferred to commercial harvest crews for use in the field. Results from instituting these changes in the field were tracked through in-field quality and harvest rates. No measurable changes were determined from the modifications. This was due to the variation in field-to-field conditions and yield. No baseline data for each field was collected prior to the installation of the modifications to the baler and the changes in settings to the shredders. The results of the storage trials are still pending until the conclusion of the storage trial.

Acknowledgements

Thanks to the ISU Research Farms, Ag Engineering and Agronomy Farm, and BioCentury Research Farm facilities and staff; and to DuPont Cellulosic Ethanol and AGCO Corp. for technical support and equipment.