

- RU name, location and primary contact for bioenergy

Corn Insects and Crop Genetics Research Unit, Ames, Iowa.
Research Leader: Les Lewis

- Current research projects and objectives

Develop new tools for evaluating and identifying maize varieties with superior properties for bioenergy production.

Determine if starch thermal properties correlate with suitability for grain ethanol production.

- Lead SYs and contact information

Paul Scott Paul.Scott@ars.usda.gov (515) 294-7825
Linda Pollak Linda.Pollak@ars.usda.gov (515) 294-7831

- Key accomplishments

We have developed a system for evaluation of lignocellulosic material for suitability as a fermentation feedstock. This system uses an engineered strain of *E. coli* to report sugar levels during the course of enzymatic hydrolysis reactions. We have tested this system on several sets of breeding material and compared the results to other methods of feedstock evaluation. The throughput of this method is high, making this method suitable for use in plant breeding programs. The sugar sensing bacterial strain provides real-time data on sugar availability in hydrolysis reactions and may therefore be useful for characterizing hydrolytic reactions as well.

We have developed several maize populations with properties that may be beneficial in grain ethanol production either by increasing ethanol yield per mass of grain or by increasing the nutritional value of the co-products. Using Differential Scanning Calorimetry to analyze purified starch from breeding lines, Linda Pollak has selected germplasm for altered grain starch thermal properties which may be related to starch digestibility. Paul Scott has developed populations with increased levels of lysine, tryptophan or methionine or reduced levels of phytic acid.

- Other scientific expertise or capabilities already available to the RU that could be applied to bioenergy research
 - Expertise Plant breeding and genetics, especially in maize and soybean.
 - Maize germplasm selected for novel grain starch properties.
 - Maize germplasm selected for improved grain amino acid balance.
 - Transgenic Maize germplasm with novel proteins in different grain tissues.
 - Plant genome databases (MaizeGDB and Soybase) are resources for genomic studies. PlexDB is a database of gene expression profiles.