DORAN, JOY B.*, JENNIFER CRIPE, MISTY SUTTON, and BRIAN FOSTER, Central Michigan Univ., Dept. of Biology, Mt. Pleasant, MI 48859. **Conversion of sugar beet pulp to ethanol using engineered bacteria.**

There is a critical need to develop alternative fuel sources that are renewable and less detrimental to the environment. Data show that sugar beet pulp is easily degraded by enzymes, does not need physical pretreatment, does not appear to produce any compounds that are strongly inhibitory, and is currently undervalued, making it an attractive substrate for a bioconversion process for generation of fuel ethanol. For the past 20 years annual production of sugar beets (U. S.) has fluctuated between 20 and 30 million wet tons with over 1.6 x 106 tons (dry wt.) of beet pulp remaining after sucrose removal. Production of feed from pulp is an economically marginal part of processing due to low feed value and relatively high costs of drying. Fermentations with pressed pulp (75% moisture) yielded slightly higher ethanol concentrations than pellets (10% moisture). To determine whether enzymatic hydrolysis of beet pulp alone is sufficient to generate carbohydrates, experiments were performed with varying loads of commercially available enzymes. Presently, there are several sugar beet processing plants that each generate over 60,000 tons of pulp, an amount adequate for an in-line conversion facility. Using our methods, each facility could produce approximately 6 million gallons of fuel ethanol, a yield similar to corn based fermentations in U.S. processes. Approximately 25 g ethanol/liter was obtained using Celluclast Ultra at 0.57% v/v and Pectinex at 0.28% v/v. When the enzyme load was increased to 0.89% v/v of each enzyme preparation, fermentations reached approximately 40 g ethanol/liter.