CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY

Name(s)

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Project Number

J0612

Project Title

Ethanol Producing Potential of Mouse Barley (Hordeum murinum subspecies leporinum)

Abstract

Objectives/Goals

The focus of my project is to select an energy crop that requires less fertilizer input, does not compete with food supply and can use low-value land. Plants from the grass family fulfill all these criteria. However, efficient and cost-effective pretreatment of grass cellulose is a challenge. My hypothesis is that higher hydrochloric acid concentrations and longer durations of sterilization will result in greater sugar and theoretical alcohol yields for a local grass known as Mouse Barley (Hordeum murinum subspecies leporinum).

Methods/Materials

Pulverized grass was subjected to nine different pre-treatments based on two independent variables: 1) HCl at 1.5%, 3% and 4.5% concentrations 2) sterilization at 20 psi for 15, 30 and 45 minutes. Three replicates were done for each of the 9 treatments. The values were then subjected to the ANOVA to test the significant differences. Then, multiple test comparisons were made using two sample paired t-test for means (alpha = 0.05).

Results

The mean sugar contents (percent) were 0.32 for 1.5% HCl/15 minutes, 0.48 (3%/15min), 0.59 (4.5%/15min), 0.35 (1.5%/30min), 0.48 (3%/30min), 0.60 (4.5%/30min), 0.35 (1.5%/45min), 0.48 (3%/45min) and 0.59 for 4.5% HCl/ 45 minutes.

Conclusions/Discussion

My conclusion is higher hydrochloric acid concentrations alone resulted in greater sugar and theoretical alcohol yields for Mouse Barley.

Summary Statement

To identify which optimal HCl concentration and sterilization duration would produce the highest sugar yield for Mouse Barley.

Help Received

Father assisted with the handling of HCL and the sterilizer; Mother helped with my board design. The statistical programs that were used are Microsoft Excel and Feliz Stats (a program I created using C# codes).