CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35239

Project Title

Alternative Energy: Producing Second Generation Biofuel from Inedible Biomass

Abstract

Objectives/Goals

Increased use of edible biomass in the production of first generation bio-fuel has been a leading cause of increase in food price index and world hunger. The alternate fuel companies depend heavily on edible biomass such as corn and sugarcane to produce ethanol as the first generation biofuel to run vehicles. To swerve around this issue, producing biofuel from inedible biomass will benefit humanity by not interfering with the world#s natural edible resources.

Methods/Materials

To illustrate the prototype production of second generation biofuel, experiments were designed to demonstrate the type of cellulose source, enzymes, and chemicals best suited in a hydrolysis reaction to produce glucose which can be fermented into ethanol. For second generation biofuel, many types of inedible plant material can be used, since cellulose from different biomass sources have the same molecular structure. Sources of inedible cellulose were wood, leaves, and stalk. Simultaneously, another experiment was conducted to determine the amount of glucose produced from edible biomass such as corn. Glucose production data from corn was compared with the inedible biomass glucose production to determine whether the inedible biomass has a higher or lower volume. To conclude which catalyst is most advantageous, comparison was done on the amount of glucose produced in a specific reaction, using the Dinitrosalicylate Colorimetric method. A Spectrophotometer was used to collect quantitative data from the experiments. By measuring and observing the absorption rate of each substance after it undergoes the chemical reaction, we can demonstrate the type of enzyme or chemical in which cellulose source is most beneficial in producing the second generation ethanol based biofuel.

Results

Cellulose sources produced glucose in a range of 0.626 to 2.363 mg/DL with an average production of 1.531 mg/DL, with the exception of Pectinase compared to 1.412 mg/DL of glucose produced in corn.

Conclusions/Discussion

Glucose extraction from inedible biomass has been demonstrated to be compatible in volume of edible biomass. Inedible biofuel can be produced economically without using food cultivating land as a source and without risk to environment or threat to living beings. I regard inedible biomass fuel as an emerging trend and need for replacement of corn based ethanol. The inexhaustible FUEL has arrived.

Summary Statement

Producing 2nd generation biofuel from inedible biomass as an alternative for extracting ethanol biofuel from edible biomass.

Help Received

Used lab facilities at Vista Del Lago High School under the supervision of Chemistry and Biology teachers including Mrs. Holbert, Mr. Ashwell, Mrs. Baker, Mrs. Moore, and Mr. Lancaster. Family helped in assembling together the display board.

Preliminary