Enzymatically Treated Cellulosic Packaging Waste Utilized to Release Fermentable Sugars for the Production of Bioethanol: A Second Year Study

Derousie, Serenity (School: Ridgeview High School)

Biofuels currently are produced through the fermentation of agricultural products. However, due to the growing issue of world hunger an alternative biofuel material was research. With reference to a previous study, the use of cellulosic materials such as packaging waste would be a successful alternative. This study is to show that bioethanol can be made with the alternative biofuel production material; cardboard. Initially, cardboard samples were digested in a buffer solution with the enzyme cellulase in order to produce glucose. Each sample underwent alcoholic fermentation by Saccharomyces cerevisiae (Brewer's yeast). Fermentation was measured through carbon dioxide production. The initial carbon dioxide level for the 25g solution was 1790ppm, while the final carbon dioxide level was 14085ppm, ending with a 12295ppm change. This calculates to 0.257g Ethanol per gram cellulosic packaging material. In conclusion, cellulosic materials; such as those from packaging waste, can be used to make fermentable sugars, which in turn can produce bioethanol. The alteration from agricultural products to packaging waste as a fermentable cellulosic material for the production of biofuel allows for the higher availability of food crops.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category