

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

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Biofuels currently are produced through the fermentation of agricultural products. However, due to the growing issue of world hunger an alternative biofuel material was researched. 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