2008 TAIWAN INTERNATIONAL SCIENCE FAIR

CATEGORY : Environmental Science

PROJECT : Bio-Conversion of Agricultural Waste to Ethanol

AWARDS : Environmental Science First Award

SCHOOL : Korean Minjok Leadership Academy

FINALISTS : Kim, Nahyun
Kim, Ghahyun

COUNTRY : South Korea

APPENDIX 2

ABSTRACT OF EXHIBIT
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NAME: Nahyun Kim, Ghahyun Kim

COUNTRY: South Korea

Contents of Abstract:

a. Purpose of the research: Find a potential way to reduce the global warming, and develop a process for the lignocellulosic ethanol production using rice straw, which is an agricultural waste.

b. Procedures: One of the greatest challenges for society in the 21st century is to meet the growing energy demand for transportation, heating and industrial processes. This significantly contributes to "Greenhouse Effect." Rice straw is one of the lignocellulosic biomasses which are renewable organic substance and alternative source of energy. For the first time, rice straw was pretreated using autoclaving or a hypochlorite-hydrogen peroxide (Ox-B) solution, which is broadly used in potable water treatment. The pretreated rice straw was hydrolyzed with two kinds of enzymes: Cellulase and Spezyme. Following hydrolysis, *Saccharomyces cerevisiae* and *Pichia stipitis* were inoculated for ethanol production.

c. Data: With the 5% Ox-B sample (initial sugar concentration was 5%), the final ethanol concentration was about 1.1%, is 87.3 % of stoichiometric and fermentation efficiency yield. Currently, we're developing a new mutant, which can use glucose and xylose simultaneously, by using soft X-Ray. In conclusion, for the first time, rice straw was pretreated by using autoclaving or hypochlorite-hydrogen peroxide (Ox-B), solution which is broadly used in potable water treatment. The Ox-B solution treatment was an essential step for efficient hemicelluloase hydrolysis. Using 5% rice straw sugar, 1.1% ethanol was obtained.

d. Conclusion: Further optimization study of fermentation process and strain improvement researches are in progress. We hope to see future cultivators to move through the energy of ethanol produced by rice straw. This project has a great emphasis towards understanding the importance of bio-energy and its nature.

評語

本研究對如何轉化稻苗內之纖維質，以及進一步轉化爲乙醇，進行了完整之製程開發，並發明了以亞氯酸與雙氧水(O_x-B)爲前處理之促進劑，可大幅減低成本並提高產率。