

Studies of Bioethanol Production from *Saccharomyces cerevisiae* Using Different Concentration of Waste Bread as Carbon Source

Nur Farhana Ismail, Muhammad Naziz Saat*

Structured Abstract

Background: In Malaysia, there are 16,688 tons of food are wasted every day. These amounts lead to substantial environmental problems. This waste increases environmental pollution, and wastes vital resources, managing food waste is more difficult because of its complexity and expense. At the same time, traditional methods of producing bioethanol from food crops put a strain on agricultural resources, causing rivalry for fertile land and jeopardizing food security.

Methods: A well-known yeast in industrial fermentation, *Saccharomyces cerevisiae* was chosen due to its high ethanol tolerance and efficacy in turning sugars into ethanol. By employing Mauripan yeast (*Saccharomyces cerevisiae*) to turn leftover bread into bioethanol, this study seeks to address these problems. Determining the rates of ethanol production and substrate consumption at different starting substrate concentrations is the specific goal. Waste bread (WB) is used as a carbon source to create bioethanol under controlled conditions, with fermentation serving as the main technique. The goal of this study is to determine the ideal substrate concentration that minimises substrate inhibition and maximises ethanol yield.

Results: Results showed that all substrate concentrations produced a gradual increase in ethanol yield. While 15% substrate concentration resulted in a lower yield, experiencing inhibition due to too much substrate, 10% substrate concentration revealed that it had an optimal effect on the fermentation efficiency by producing the balance between biomass yield, ethanol yield, and substrate usage.

Conclusion: Finally, it is proved that bioethanol can be produced from waste bread, presenting an environmentally friendly way to manage food waste and strengthening the development of renewable energy.

Keywords: Bioethanol, Waste Bread, Carbon Source

*Correspondence: naziz@uitm.edu.my

School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia