

Fermentation study on macroalgae *Eucheuma cottonii* for bioethanol production via varying acid hydrolysis

Abstract

The depletion of fossil fuel and the increase of human population lead to the search for more sustainable alternatives. Currently, bioethanol is produced from land-based crops, but in the future, marine biomass could be used as an alternative biomass source because it does not take up land area for cultivation. In this chapter, seaweed *Eucheuma cottonii* (cultivated in Sabah, Malaysia) was tested for its potential for bioethanol production via fermentation by yeast *Saccharomyces cerevisiae*. *E. cottonii* contains cellulose and carrageenan which will be hydrolysed into glucose and galactose, which in turn was converted to ethanol by the yeast. This study showed that the extracted seaweed gives higher percentage of ethanol (9.6% v/v) compared to non-extracted seaweed. Subsequently, it was found that low molarity and high-temperature acid hydrolysis at 0.0M, 100% (8.4% v/v) produced the most ethanol. It was followed by hydrolysis 0.1M, 30% (7.7% v/v); 0.4M, 30% (4.7% v/v); and 0.4M, 100% (3.4% v/v) with fresh feedstock. In this research, among the three fermentation media, it was found that Yeast Peptone Dextrose (YPD) broth yields the highest percentage of ethanol (9.6% v/v) followed by Yeast Extract Peptone (YP) broth producing 4.7% v/v ethanol. This productivity level makes macroalgae a promising substrate for bioethanol production.